

Engineering Library  
GENERAL LIBRARY  
JUL 2 1920  
UNIV. OF MICH.

71

# PUBLIC WORKS.

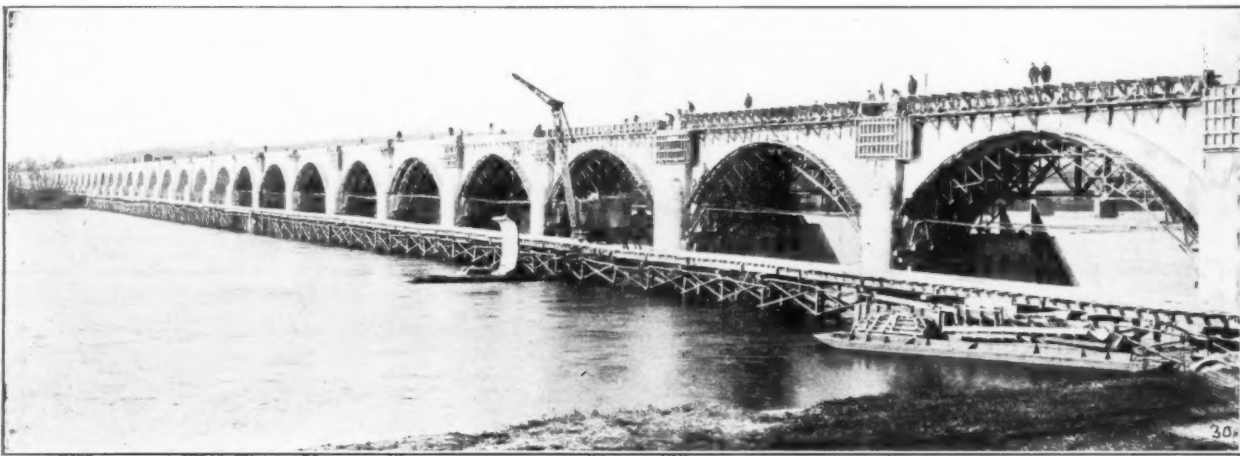
CITY

COUNTY

STATE

A COMBINATION OF

"MUNICIPAL JOURNAL AND PUBLIC WORKS" and "CONTRACTING"



CONSTRUCTION ON STEEL TRUSS CENTERS, OF 44-SPAN CUMBERLAND VALLEY RAILROAD BRIDGE AT HARRISBURG, PA.

All trusses made same length and supplemented by wooden blocking to fit span  $2\frac{1}{2}$  feet longer than minimum. Twenty-two duplicate piers concreted in interchangeable steel forms. (See page 568)

## IN THIS ISSUE

Measuring Internal Pressures in Hydraulic-fill Cores

Santa Barbara's Gibraltar Dam

Battle Creek Water Works

Operating a Mechanical Filtration Plant

Electric Pumping in Concord, N. H.

Laying a Submerged Water Main

Mechanical Equipment for Highway Construction

Repainting an Old Steel Bridge

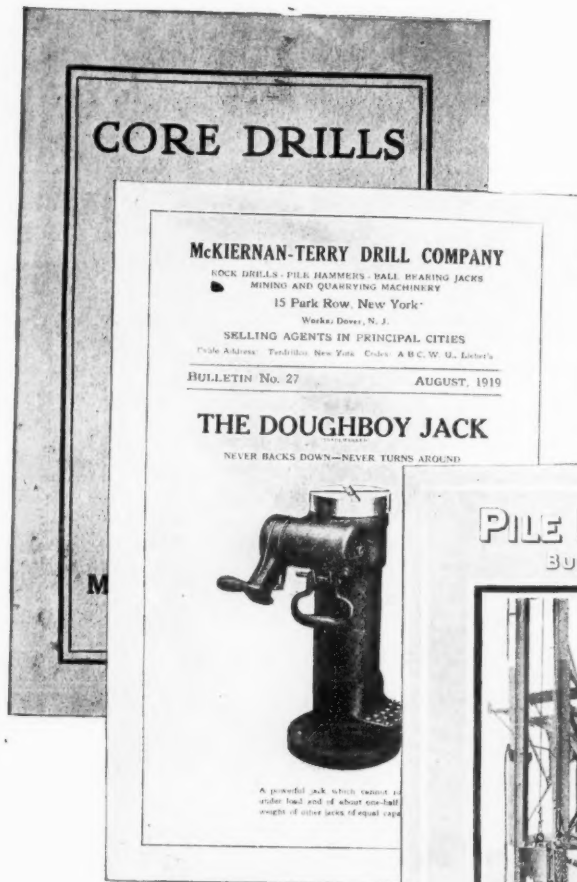
Avoiding Falsework in Bridge Repairs

Public Comfort Stations in Wisconsin

City Planning Bibliography

NEW YORK, JUNE 26, 1920

# McKiernan-Terry Products



Success or failure now-  
adays depends largely  
on the selection of re-  
liable labor saving equipment.



McKIERNAN-TERRY  
PRODUCTS have made  
good wherever used. If  
you are unacquainted  
with them, write for any  
of the bulletins shown  
on this page.

## McKiernan-Terry Drill Company

17 Park Row

NEW YORK

# PUBLIC WORKS.

CITY

COUNTY

STATE

A Combination of "MUNICIPAL JOURNAL AND PUBLIC WORKS" and "CONTRACTING"

Vol. 48

NEW YORK, JUNE 26, 1920

No. 24

## Measuring Internal Pressures in Hydraulic-Fill Cores

An earth-pressure cell, used by the U. S. Bureau of Public Roads, was adopted for this use and several were buried at different depths in the semi-fluid core, where the relation between horizontal and vertical pressure indicated the rate of solidification of the material.

In hydraulic-fill dams, such as were described in the issue of Public Works for May 8, the core is the critical point in the design and construction, the remainder of the dam furnishing merely the dead weight which holds the water-tight core in place. The core in the dams of the Miami Conservancy district is composed of clay and silt with considerable quantities of very fine sand, the entire material being as fine as commercial cement. Such material consolidates very slowly in the bottom of the pool, especially where clay forms a large proportion of it, in which case the core may retain its water and remain semi-fluid for weeks and even months. In the Calavaras dam in California this condition persisted for more than a year.

Although in the Miami Conservancy dams the core contains a relatively small proportion of clay, and careful study gave assurance that the hydraulic-fill method, using the material there available, would be a safe and economical one, it was deemed wise to endeavor to watch the process of consolidation in the core, so that it might be known absolutely that proper solidification was secured. Such a study of core materials has never been kept hertofore in a hydraulic-fill dam, and no method had ever been devised for it, save the very crude one employed at Calavaras of sounding the pool with a six-inch cast iron ball to see how far the ball would penetrate. The conservancy engineers wished for something better, and the means em-



UNFINISHED HYDRAULIC-FILL DAM AT GERMANTOWN, SHOWING TOWER FROM WHICH PRESSURE CELLS ARE SUSPENDED. CORE POOL IN CENTER FOREGROUND, WITH "BEACH" ON EACH SIDE.



ployed by them are described in the Miami Conservancy Bulletin, from which the following description is abstracted.

The clue to the means employed was furnished by the investigations of the U. S. Bureau of Public Roads as to pressures on the concrete floors of bridges when covered with an earth fill and subjected to loads, the object of these investigations having been to furnish figures to be used in bridge design. To ascertain these pressures, that bureau had originated (through A. T. Goldbeck) a device which would measure earth pressures in a manner analogous to measurement of steam pressure by a steam gauge. It occurred to the conservancy engineers that by applying these pressure cells to measuring the pressures within the cores at various depths as the dams were built up, it might be possible to arrive at a knowledge of the solidification of the core materials. The general reasoning was as follows:

A core or other material, while in a fluid condition, exerts pressure equally in all directions. When the material becomes solid, however, the horizontal pressure does not exceed  $1/3$  to  $1/4$  of the vertical pressure; while in intermediate plastic stages, the horizontal pressures will be intermediate between those of a liquid and a solid. Therefore, the ratio of the sidewise pressure to the downward pressure at any point will be a measure of the degree of solidification reached at that point. As the Goldbeck pressure cell registers pressure in one direction only, by placing two of these at a given point, one measuring vertical and the other horizontal pressure, a comparison of these two pressures will indicate the degree of solidification at that point. By noting the pressure of a pair of cells at regular intervals of time, it is possible to obtain a complete history of the process of core solidification throughout the entire period of the construction of the dam.

This idea was used as the basis of the plans carried out, during the development of which Assistant Chief Engineer Charles H. Paul made several visits to the Bureau of Public Roads in Washington, and the bureau itself conducted a preliminary investigation for the district with pressure cells suspended in a 36-inch standpipe 41 feet high, into which a mixture of clay and water was introduced under conditions approximating those

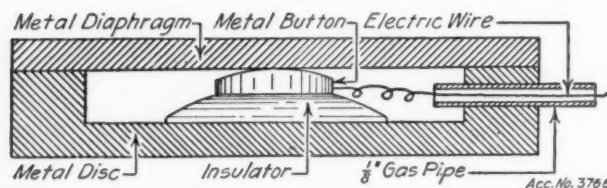
in the core of a hydraulic fill dam. This investigation demonstrated the feasibility of the plan. The Bureau of Public Roads also sent Mr. Goldbeck to Dayton to co-operate in the installation of the apparatus in the dams.

The accompanying illustration and the description subjoined to it explain thoroughly the construction and operation of the pressure cell.

The method of installation of the cells depends on the type of dam outlet structure. At three of the dams there are spillways between heavy retaining walls which extend entirely through the earth embankment up to its full height, and in these dams the cells are supported on the back faces of these walls. At the Germantown and Englewood dams the spillway is a separate structure and no such walls exist. Here the plan provides for supporting the cells on three light wooden towers, one near the center line of the core and one near each of its two faces. These towers are built up section by section as the material in the dam rises during construction. Cells are attached to these towers at intervals of ten feet in depth for measuring lateral pressure and at intervals of 30 feet for measuring vertical pressures. The pipes carrying the air pressure to the cells are suspended vertically from the tops of the towers. The compressed air tank, air gauges, etc. are carried on a platform at the top of the tower. In order that the pressure cells may settle with the material in the core, each cell with its ascending air pipe is suspended by a wire running over a pulley at the top of the tower, the other end of the wire carrying a counter-weight. The air tank and air gauge are connected to the top of each pipe by a rubber hose with a valve.

Observations of these gauges have been and are being made at monthly intervals, and the measurements are plotted on diagrams to facilitate study and comparison. Several such diagrams for the Germantown dam are shown in the accompanying illustration, in which the upper row refers to cells near the center of the dam and the lower row shows conditions in the gravel slope near the downstream edge of the core. Each rectangle gives the results of one full set of monthly observations. The depth of the cell is indicated by its distance below the line W. S., indicating water surface in the pool, and S. S. indicating the surface of the silt; while the horizontal distance from the zero ordinate indicates the pressure.

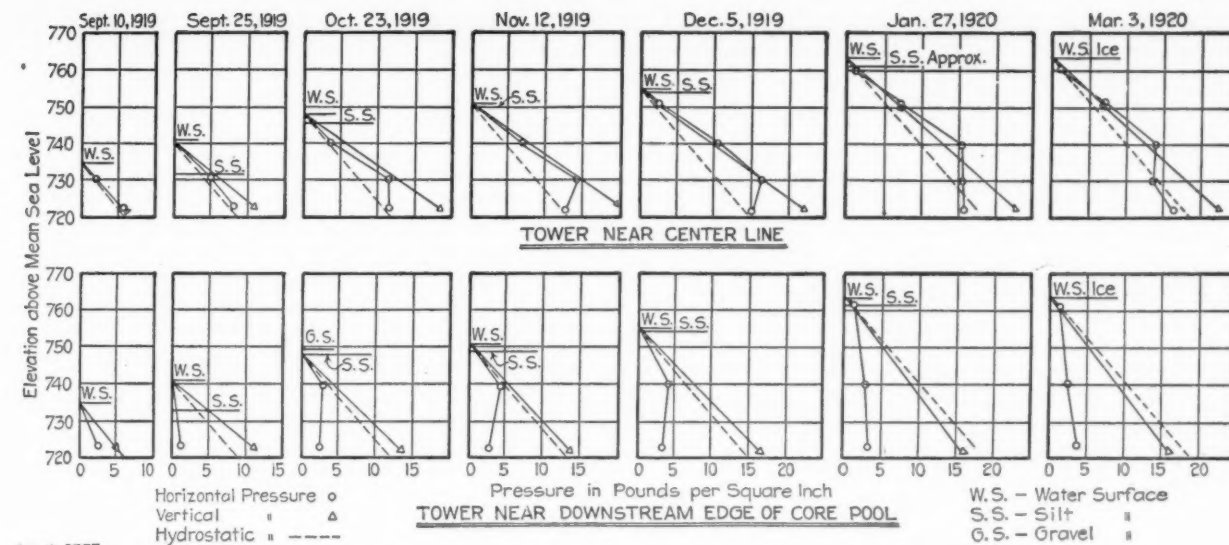
For example, in the left upper rectangle the upper small circle indicates that on September 10, 1919, there was a horizontal pressure of about two pounds per square inch in a cell 4.5 feet below the level of the water in the core pool. In the same diagram, the circle and triangle near the bottom practically coincide, showing that at that depth, about 12 feet, the vertical and horizontal pressures were practically the same, indicating that the mud at this point was still practically liquid. The dotted lines in each case indicate what the hydrostatic pressure would be if the core material were water instead of mud, and in the diagram under consideration the pressure is seen to be slightly greater than the hydrostatic pressure would be.



GOLDBECK EARTH PRESSURE CELL

For greater clearness, this is shown as a diagram rather than as an exact cross section. The cell is a hollow metallic disk, one face of which (top face above) is an elastic metal diaphragm. The cell is buried in the earth of the dam. The earth pressure keeps the diaphragm pressed against the rounded surface of the metal button, thus closing an electric circuit carried by wires to the top of the dam through a small air pipe, as shown. When a measurement is to be made, air is admitted into the hollow of the cell from a compressed air tank on top of the dam, thus balancing the earth pressure, till, just at equilibrium, the diaphragm is forced outward, breaking the electrical contact with the button. The break is indicated by the going out of a small electric indicator lamp in the circuit. The pressure is then read on an air gauge connected with the air pipe line.





The second diagram shows that 15 days later the water surface in the pool had risen 6 feet higher and that a distinct surface of silt had formed at the bottom of the pool about 9 feet below the water surface. At a depth of about 18 feet below the water surface the vertical pressure was about 11 pounds and the lateral pressure about 8 pounds, thus indicating a stiffening of the mud at this depth. Following these bottom pressures through the series of diagrams, it is seen that the horizontal pressure increases slowly as the water surface is raised, but by January 27 had become less than the normal hydrostatic pressure.

The diagrams also indicate that below a depth of 25 feet, the horizontal pressure remains constant, although the depth of core material is steadily increasing and the vertical pressure increases at the same time. "Analysis which cannot be given here would seem to indicate that this means a sufficient stiffening of the core material such that, if a cube of it were cut several feet high, it would stand alone like a piece of cheese. Explorations are in progress to ascertain by examination of the actual materials whether this is the true state of affairs. If so, it will constitute an additional assurance in this important matter. In any case, there can be no doubt that the pressure cells have already proved their value in action and have indicated a condition of the core materials which is very satisfactory to the engineers in charge.

"This is no less true of the materials in the sand and gravel retaining embankments between which the core lies, as may be seen by an inspection of the lower row of rectangles, showing the conditions just outside the pool margin, where the materials, by their open, porous texture, permit free drainage of the water which slowly escapes sideways and downward from the core. This is an important function, and the lower diagrams show that the porous materials are performing it in a highly satisfactory manner. The small circles show that the horizontal pressure at the bottom of the dam, in these materials, never exceeds  $3\frac{1}{2}$  pounds, although the water pressure alone, at the depth

reached by the material in the last two diagrams, would be about  $19\frac{1}{2}$  pounds, if the water were confined."

### Illinois Highway Situation

In 1919 the state of Illinois contracted for the struction of 600 miles of highway, agreeing that if the state were unable to furnish cement the contractor should buy it in the open market subject to the approval of the state. Because the state has been unable to buy it, only about 160 miles of the road have been completed and contractors are threatened with a heavy loss on equipment, organization and overhead through the delay. They have expended considerable sums, assumed risks and undertaken obligations to carry out their contract, but the state officials are now unwilling to pay the heavy cost of getting cement to the work caused by transportation conditions.

The contractors have proposed that the state take over the job and equipment and materials stored and properly adjust each contract. The state claims it has no authority to do this and asks the contractors to voluntarily relinquish a large proportion of their jobs. The bulletin of the Associated General Contractors of America suggests that "the contractors get together in an association of sufficient strength to force the state to play fair."

### Michigan Roads Injured by Traffic

State and county highway commissioners of Michigan and representatives of the federal highway commission recently held a meeting to discuss the question of destruction of roads by heavy traffic. Concrete highways recently constructed in Michigan at a cost of from \$40,000 to \$50,000 a mile have in many instances been destroyed by the strain imposed upon them by heavily laden trucks.

While there is on the statute books of Michigan a law limiting the load trucks may carry over good roads to a certain number of pounds to the inch width of tire, this has never been rigidly enforced and it is doubtful whether enforcement would

bring a real improvement in conditions. It is contended by some engineers that roads built on a heavier base, at nearly double the cost of present construction, would stand the wear of heavier haulage.

Better subgrading and drainage, absolute adherence to specifications and adequate detours for the use of the public while highways are being built were advocated also.

### To Investigate Cincinnati-Hamilton Highway

Governor Cox of Ohio has ordered that an investigation be made of the Cincinnati-Hamilton paved highway. There have been rumors of fraud with regard to this road for some time. The following was issued at the governor's office:

"Governor Cox, after making a personal inspection of the paved road between Hamilton and Cincinnati, has asked the Highway Advisory Board to conduct a thorough investigation. The work was done before Mr. Taylor became Highway Commissioner. The governor, in his report to the board, says that it is such a disgraceful exhibit of inefficiency that there are at least superficial symptoms of fraud. It has been reported to the state that inspectors were changed while the work was in progress, and a preliminary survey shows that the spots of poor work and the recorded time of their completion suggest a suspicious coincidence."

### New Jersey's State Highway Engineer

William G. Thompson, state highway engineer of New Jersey, has resigned his position in order to take up private engineering in New York. Watson G. Clark, of Tenaflly, has been appointed temporary consulting engineer until Mr. Thompson's position can be filled.

Mr. Clark is one of the most active members of the highway commission and is conversant with the entire program of state highway construction. He has agreed to devote at least three days a week to the department.

Mr. Thompson is a native of Connecticut and served on the engineering staff of General George W. Goethals during the construction of the Panama canal. He first came to New Jersey in the capacity of assistant highway engineer, and was appointed state highway engineer in 1918.

### Protest Against Suspending Highway Construction

The Portland Cement Association has issued a circular letter protesting against obstacles and delay to highway construction which will be more and more urgently needed for moving food crops in the latter part of this season and for increasing measure of relief to railroad congestion.

## Santa Barbara's Gibraltar Dam

**An arch gravity dam constructed under unusually difficult conditions. All materials were brought to the work through nearly four miles of tunnel which formed a part of the aqueduct, there being no practicable surface trail.**

A few years ago the city of Santa Barbara, Cal., purchased the property and water rights of the Santa Barbara Water Company. This company had obtained its supply from wells, but was planning to tunnel the range of mountains bordering the coast and to dam the Santa Ynez river to obtain an additional supply. The city drove a tunnel with this idea a few thousand feet, when it struck a considerable flow of water, which is now used for domestic purposes is Montecito, a city near the mouth of the tunnel.

Meantime, a better reservoir basin had been found on the Santa Ynez river, and the first tunnel was abandoned and another, known as the Mission tunnel, was started to lead to a reservoir formed by what is known as the Gibraltar dam. The south portal of this tunnel, which is 19,900 feet long and 9 feet by 6 feet in cross-section, is about seven miles from the heart of Santa Barbara. This tunnel also tapped a considerable flow of underground water, which is being used as part of the city's supply.

The project was carried out under the supervision of the Board of Water Commissioners, with

Quinton, Code and Hill of Los Angeles as consulting engineers in charge of design and construction. E. E. Haskell was supervising engineer and Robert Westwick was assistant. Robert Craig was city manager of Santa Barbara. On July 8, 1918, a contract was entered into between the city and the Bent Brothers and W. A. Kraner for the construction of Gibraltar dam and the appurtenant structures. This contract was completed and the work accepted on January 23, 1920. The work was completed in a little over eighteen months, during three months of which no work could be carried on because of the danger of floods. Mr. Kraner had supervision of the work, and M. H. Slocum and C. W. Hamilton were superintendents.

#### DESCRIPTION OF THE DAM

The Gibraltar dam is of the arch gravity type, 1,100 feet long, 185 feet high from the lowest bed rock to the top of the outlet tower, which is 5 feet higher than the crest of the dam. The dam is curved to a radius of 239.5 feet on the center line. The width at the top is 8 feet and the maximum width at the bottom is 65 feet. The dam and spill-

way combined contain about 54,000 cubic yards of concrete. The depth of water to the spillway is 135 feet, and there is impounded behind the dam a lake about  $4\frac{1}{2}$  miles long containing about 16,000 acre-feet. With 10 feet of water flowing over the spillway, the highest recorded flood of the river can be more than provided for. However, 13 feet of water can pass over the spillway, which is 280 feet long at the crest, and slightly more than 300 feet long 13 feet above the crest.

The outlet tower forms an integral part of the dam. Water is conveyed from this through a 3 foot 6 inch reinforced concrete conduit about 200 feet long to a tunnel 900 feet long, from which it enters and flows through 1,600 feet of 3-foot reinforced concrete pipe to the north portal of the Mission tunnel. After flowing through the 19,900 feet of this tunnel the water is carried over most of the canyons on concrete trestles, although siphons

contruction material meant a long and expensive delay, so the contractor determined on bringing all equipment and materials through the Mission tunnel, thus shortening the time of construction on Gibraltar dam about one year.

Two hundred and seventy thousand sacks of cement, 400,000 board-feet of lumber and all equipment, including a steam shovel, crushers, screens, cars, locomotives, hoists, cableways, concrete spouts, hoppers, etc., were successfully transported through the tunnel. The contractor exercised considerable ingenuity in the choosing of equipment. He had to be sure that the largest single piece of each machine could be taken through the tunnel. The major portion of the equipment was dismantled at the south portal and assembled at the site of the dam. It was necessary to follow the same process at the completion of the job, all equipment being dismantled and hauled through the bore and



**GIBRALTER DAM, SANTA BARBARA WATER SUPPLY**  
Stores water of Santa Ynez river for the city supply.

are used in some instances. A pipe line, most of which is redwood stave, conveys the water to a distributing reservoir near the city. Along the line from Mission tunnel to the reservoir there is considerable fall, and the city proposed to utilize this for developing hydro-electric power in several of the canyons crossed. The entire development represents an investment of nearly \$2,000,000.

#### CONSTRUCTION OF THE DAM

For construction purposes, an 18-inch gauge track was laid in the tunnel, on which electric locomotives hauled all equipment, supplies and men to and from the north portal. The small size of the tunnel and the attendant difficulties of transporting construction equipment governed, to a large extent, the type and size of equipment that the contractor could use. There was a trail for pack horses over the mountains, and a road by way of the San Marcos Pass, the last twelve miles of which was impassable to all but saddle horses. To put this road in shape and make it fit for use for bringing in

assembled at the contractor's yard in Santa Barbara.

Electric power was used for all construction and camp purposes, with the exception of the steam shovel, fuel oil for which was transported through the tunnel in a perfectly tight steel tank. Explosives were not allowed to be transported through the tunnel but were carried over the mountains with pack trains.

Rock and sand for the construction of the structures was obtained from the upstream side of the dam, being dug from the natural deposits by a steam shovel and loaded in 6-yard cars, which were hauled by a gasoline locomotive to the crushing and screening plant, which was located in the river bottom 200 feet upstream from the surface of the dam. After crushing, screening and washing, the aggregate was transported by electric hoist to bins on the hill above by two  $1\frac{1}{2}$ -yard automatic dumping buckets running on two  $1\frac{1}{2}$ -inch cables, one for sand and one for rock. Owing to high water prevailing during the winter months and covering the



existing deposits of rock and sand, the contractor deemed it advisable to close the work down on December 15, 1918. Work was resumed on April 1, 1919, although concrete placing for the year did not start until May 15, 1919, owing to a delay in receiving some equipment. From this date concrete was placed continuously until completion.

Cement was transported through the tunnel on cars carrying 50 sacks, and was delivered at a warehouse about 1,600 feet from the north portal. Before concreting started, there was a reserve supply of about 32,000 sacks of cement. After concreting had been started, the loaded cars were picked up just as they came through the tunnel by a cableway of 800 feet span, and set on a track at a landing platform at the head tower of the cableway. They were then let down by gravity to the mixer. The empty cars were brought back and sent down the cableway to the warehouse.

Concrete aggregates were measured in automatic

measuring chutes and mixed in a one-cubic-yard mixer of the batch type, which dumped into a skip of 30 cubic feet capacity, which elevated the concrete in a tower the maximum height of which was 185 feet, from which it was dumped into hoppers and distributed in spouts.

The concrete tower was located as near the center of the structure as the topography of the site would permit, and the placing of the plant required much thought and careful planning. Owing to the sharp radius and the length of the dam, it was difficult to locate the tower and mixing plant so as to completely cover the work.

The contractor was particularly careful to secure alignment during the construction, the result being that at no place on the dam is variation from true line greater than one inch. The handling of concrete and the proportioning of the aggregates were carefully watched and the exterior surfaces are remarkably free from irregularities and voids.

## Repainting an Old Steel Bridge\*

Loose paint and dirt were removed by sand blast for 1 cent per square foot.  
Structure was repainted with 12 kinds of paint for different parts.

The paint on the structure was in very good condition, except as already detailed in regard to the upper work of the railway deck. It had been completely renewed three times in the preceding twenty-two years, with a 75 per cent home-mixed white lead, zinc and linseed oil paint. While no comprehensive method had been adopted in removing rust spots before applying the new coats of paint, the deterioration from rusting was practically nothing (except on the railway floor) on starting to clean the structure thoroughly with Mott sand-blast machines, and it was found that the original coats of red lead and white lead and zinc were intact over about 20 per cent of the 480,000 sq. ft. of surface. Therefore, the sand-blasting was only used to clean off all dirt, loose and dead paint, and thoroughly to burrow out the small rust spots. As soon as possible after cleaning, these rust spots were coated with Tockolith to kill any small amount of rust missed, or the starting of incipient rust. The machines used for the sand-blasting were two No. 1 Mott sand-blasting machines and one No. 2.

### COST OF SAND BLASTING

When it was found that silica sand would cost more than \$6 per ton delivered at the bridge from Illinois, several local sands were tried, and the dried locomotive sand procured from the Grand Trunk Railway roundhouse was found to be sharp enough to give the results desired. The maximum speed in cleaning reached as high as 25 to 30 sq. ft. of surface per minute, and the entire cost of the work, including labor, sand and power, was close to 1 cent per sq. ft., so that the average reached was only

about one-tenth of the maximum possible, due to lost time in charging sand, changing nozzles, building and changing scaffolds, and all the usual delays in work of this character. The interference from other classes of work under way was also a big factor in reducing the efficiency of the cleaning, and it would seem easily possible on an ordinary bridge with no other work in progress to reach an average of 6 to 8 sq. ft. per minute. In any event, it proved to be the one best way properly and thoroughly to clean an old bridge. Improvements in the apparatus were made by reaming out a tapering entry for the sand in the inner ends of the loose nozzle tips, and by using bent nozzles for reaching surfaces that were difficult for the operator to get at, and for the inside of latticed members.

The carburetor on the machine should also be improved so as not to clog up with damp sand, as it was nearly impossible to keep the sand dry in only damp and foggy weather, while in wet weather work soon had to be practically suspended.

### SELECTION OF PAINTS

The great variety of conditions on various parts of the structure required the use of twelve different kinds of coatings, each one for a specific purpose, as will be briefly described. They were red lead, white lead and zinc, Tockolith, graphite, Galvanum, cement paint, fireproof paint, turpentine asphaltum, Hermastic enamel, enamel primer, carbolineum, and cement gun coating.

The red lead was 60 per cent ready mixed, with asbestine and other suspension pigments. This was used for the shop assembling and first coat, but for the field 3 lb. of lamp black per bbl. was added to insure further the keeping of the red lead in sus-

\*Excerpt from paper on Revision of Niagara Railway Arch Bridge by Charles Evan Fowler, presented to the American Society of Civil Engineers June 2.

pension, to increase the spreading, and to darken it so the silver-gray lead paint would cover more easily. It was intended to use this for all metal fully exposed by the sand-blast as a first or spotting coat, but a study of conditions caused a change to Tockolith, as stated.

The white lead silver-gray color paint was for the finish. It was 60 per cent white lead, 20 per cent zinc, and 20 per cent barytes and other pigments. The white lead and the zinc were each increased from 5 to 10 per cent in the field, so as thoroughly to cover the darker paints.

The Tockolith was substituted for the red lead to cover rust spots after cleaning, as the writer's experience for several years in painting badly rusted metals has shown that this paint absorbs the oxygen from rust and stops further rusting. The cutting apart of girders for reinforcing disclosed that where the surfaces had been painted with red lead between cover-plates and angles before shop assembling, all the paint had been practically burned out during riveting. Therefore, Tockolith was tried for much of the assembling paint in the field.

The use of Superior graphite was deemed necessary on the bottom of the copper-steel floor to resist drippings from salt water, acids, and gases. One coat was used for this purpose and the second coat was the white lead finish paint. Graphite is undoubtedly one of the few paints that should be used for assembling, so as not to be burnt out in rivet driving. Possibly better results would be had by substituting something, at least in part, for the linseed oil.

The Galvanum was used for painting a few hundred square feet of galvanized corrugated-steel roofing between the girders at the toll offices. Ordinary paint could have been used by first washing the galvanizing with a weak muriatic acid solution, or by adding cut shellac to ordinary paint.

The cast-steel bases and boxed-in-bases of the viaduct columns were filled with waterproofed concrete, formed with the addition of Medusa compound. To exclude the water further and to match up with the silver-gray coat on the bridge, Acme cement paint was used for painting the exposed surfaces of this concrete.

The use of Acme fireproof paint for the timber floor was investigated by painting some boxes and attempting to burn them. The results were so satisfactory that it has been recommended that the cracks in the roadway and sidewalk floors be sprayed with this paint as soon as the lumber dries out in the spring, in order to prevent fires starting from cigarette and cigar butts.

The elbows and inclined sections of the 4-inch steel pipe downspouts were painted with turpentine asphaltum as a partial protection from salt water, since it was not possible under the conditions existing to use Hermastic enamel in this location.

The Hermastic enamel was used for coating the copper-steel drainage floor as a protection against the rusting or corrosion of the steel of the railway floor system due to salt water and other drippings. The copper-steel plates were also coated with this where they had a bearing on the maple risers, and in addition the maple was given a coat. The metal was first cleaned, then coated with the enamel primer, and the Hermastic enamel applied with

special daubers, while the enamel was very hot. Even then it would only spread a distance of 12 to 18 inches. Owing principally to the thickness of the plates and the constant breeze or wind down the gorge, about 50 per cent excess of the enamel was used and the average thickness was more than one-quarter inch.

Carbolineum was used for all timber treating, and it was generally applied hot with a brush, but the blocks were dipped in the kettles where it was heated. From one-fourth to one-half of coal oil was added to increase the spreading and penetration of the carbolineum. The timbers treated were the spiking strips for the highway floor, the maple risers and blocks for the tie-risers, as well as the stopwaters and other minor timber details.

The concrete abutments and walls were simply painted with a cement mortar cream by the cement gun.

#### SAND BLAST MACHINES

The sand-blast machines were made by the Mott Sand Blast Company, of Brooklyn, N. Y., and as stated were three in number, the No. 1 size consuming 94 feet of free air per minute, and holding 500 pounds of sand, while the No. 2 size consumed 94 feet of free air per minute and held 1,000 pounds of sand. They consisted of a sand tank filled through a sieve at the top, and discharging through a conical bottom to the carburetor where the compressed air is introduced, all regulated by suitable valves. The discharge hose is of special heavy reinforced rubber, and carries a nozzle which has small hardened cast replaceable tips. These tips were those reamed out conically to allow freer discharge, and special bent nozzles were made to facilitate work which was often somewhat out of reach and partly inaccessible for the ordinary nozzle.

## Battle Creek Water Works

Battle Creek, Michigan; obtains water through the municipal system which is operated by the Department of Public Works, W. W. Brigden being superintendent and engineer in charge of water works, sewers and other public utilities. To Mr. Brigden we are indebted for the following information concerning the system.

The works were constructed in 1887, water being taken from Goguwac Lake, which has an area of about 360 acres and a maximum depth of 80 feet. Although this supply is excellent for commercial uses the citizens were not very well satisfied with it for potable purposes, and in 1914 another supply was obtained at a distance of between 4 and 5 miles from this lake, water being obtained from driven wells in the Marshall sandstone. This station, however, like the other, has a capacity of only about eight million gallons per day, which is not sufficient to provide for the heavy sprinkling done during the long-continued hot, dry weather in summer. But the capacity of the two stations combined has never been taxed to more than  $\frac{3}{4}$  of its full possibilities. Because of the better quality of the well water,

however, the city is about to make extensive additions to the well water plant sufficiently to double its capacity and make it unnecessary to pump from the lake. The well supply is excellent for a potable water, but has a hardness of about 230 parts per million—chiefly of the temporary variety—and deposits considerable scale in boilers and other heating apparatus. The lake supply gives practically no deposit unless the boilers are run beyond their rated capacity.

The combined plant is worth \$1,300,000, but all of this has been paid for by its earnings except a little under \$250,000. There are more than 8,000 consumers and there will soon be about 80 miles of pipe from 4 inches to 20 inches in diameter. The department has accumulated a surplus in the water fund of over \$63,000, which, together with the excess earnings in 1920, will be expended for extending and improving the well water plant. The city owes nothing whatever on the water works plant except current bills. All of the two bond issues that were outstanding have been paid.

The water rates are from 4 cents to 13 cents per thousand gallons, practically all of the services being metered. "The water department has been operated as a non-partisan affair and to a large extent has been carried on in the same manner as a first class private corporation would conduct its business. It cannot be said that politics and personal favoritism have been absolutely eliminated, but it is the opinion of most of our citizens and those of other surrounding towns that Battle Creek has come as near to carrying on a proper business management of its water works as any city in or near the state of Michigan."

### Pennsylvania Road Contracts

Contracts made by the state of Pennsylvania call for an aggregate of nearly 650 miles of road improvements, either completed or under way, costing \$2,702,012. The greater part of the road contracted for during 1919 is of reinforced concrete type, the remaining mileage being divided among bituminous concrete, brick, sheet asphalt and plain concrete. 486.21 miles of reinforced concrete cost \$21,558,111.65, making the average cost per mile \$44,358.25.

### Opposes Federal Highway Commission

Continuance of the present plan for development of good roads by joint appropriations by the government and the states was advocated before the senate post office committee by representatives of highway commissions of twelve states, including Alabama, North Carolina, Texas, Oklahoma, Missouri, Indiana, Iowa, Kansas, Nebraska, Minnesota, South Dakota and Vermont. They opposed the Townsend bill proposing creation of a federal highway commission.

### Alternate Plans Permitted by Specifications

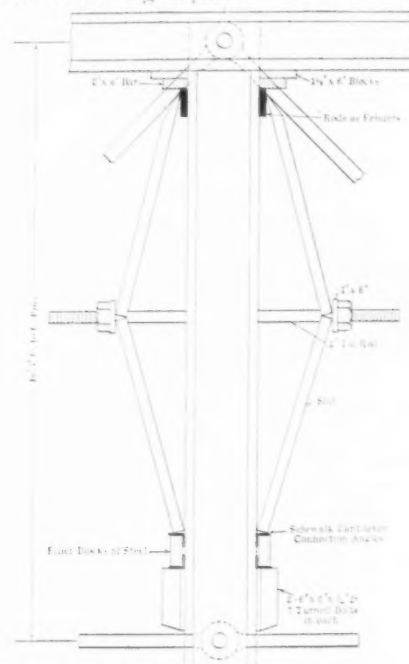
The Indianapolis chapter of American Association of Engineers is vigorously discussing whether "engineering welfare may be promoted by encouraging open specifications for engineering design, that is, the submission of alternate plans by bidders,

subject to the approval of the engineer or architect in charge."

It is claimed that this would provide additional work for engineers; develop engineering qualifications in the bidder; produce better solutions; increase competition; eliminate the incompetent low bidder; improve efficiency and appearance of designs; encourage skilled construction; permit guarantee of construction; discourage pooling; relieve the engineer of suspicion; pay its own way by increased efficiency.

### Avoiding Falsework in Bridge Repairs

In recent repairs to the railway arch bridge across the Niagara river, the consulting engineer, Chas. E. Fowler, found it necessary to reinforce the vertical posts in the 115-foot deck approach span which he accomplished in an ingenious manner described in a paper presented to the American Society of Civil Engineers June 2d. The method adopted, although applied to a railroad structure, is equally suitable for similar operations on a highway bridge and its adoption or modification for such purposes is likely to effect a considerable saving of time and expense over the alternative, which is generally employed, of supporting the structure on falsework during repairs.



TOGGLE RELIEVING VERTICAL POST OF BRIDGE TRUSS FROM COMPRESSION

Shelf angles, already existing on opposite faces of the vertical posts at the lower ends, were reinforced by filler blocks and additional bolts and supported the lower end of a simple toggle made with four flat steel slabs and a screw ended tie-rod. The upper end of the toggle took bearing against steel plates that distributed the pressure on the top chord.

When the toggle was operated by screwing up the nuts on the tie-rod it developed vertical tension in the posts until the compression was eliminated; that is, the original stress in the post was transferred to the toggle, leaving the centre part of the post unstressed and permitting the reinforcement plates to be riveted to it in a proper manner.



# Public Comfort Station in Wisconsin

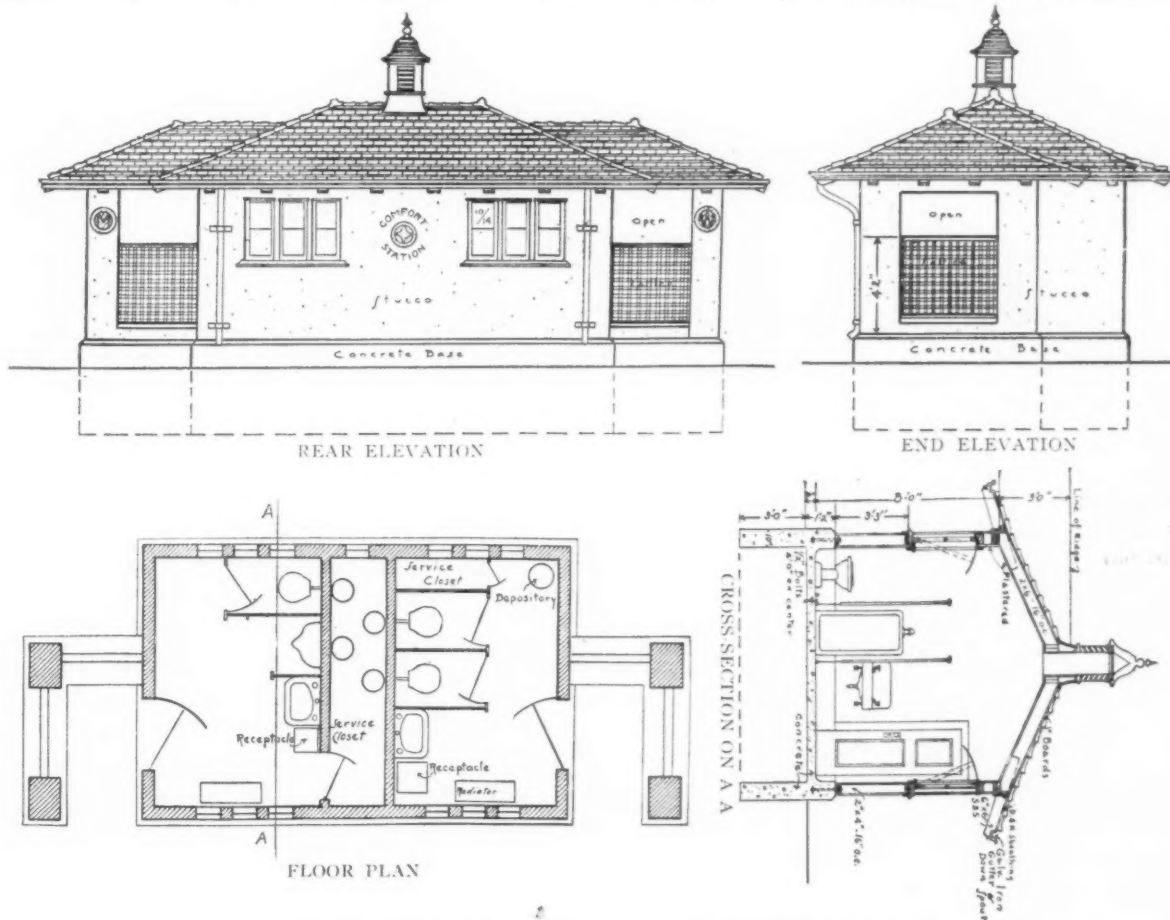
In conformity with a bill passed by the Legislature, the State Board of Health has issued rules and regulations governing the installing and maintaining of such stations by all incorporated communities of the state, and has suggested general plans and structural details.

A law passed by the legislature of Wisconsin in 1919 provides that "every city and incorporated village shall provide and maintain a sufficient number of suitable and adequate public comfort stations for both sexes. The State Board of Health shall establish rules and regulations governing the location, construction, equipment and maintenance of public comfort stations, and may prescribe minimum standards that shall be uniform throughout the state." This makes it mandatory for all cities and incorporated villages in Wisconsin to provide public comfort stations and for the board of health to establish rules and regulations concerning them.

In conformity with this law, the State Board of Health has recently issued a set of rules and regulations governing the adequacy, location,

equipment, maintenance, safety and sanitation of public comfort stations either to be built or already in existence in the State. These have been published in pamphlet form, accompanied by numerous sketches and suggested plans for such stations. The following points have been selected from this pamphlet.

It is suggested that public comfort stations may be located in public buildings. Also, that the development of the public comfort station movement will witness the establishment of many of such stations along public highways for the convenience of the traveling public. The board also suggests the granting of concessions such as telephone booths, parcel checking stands, vending and weighing machines, shoe shining stands, newspaper privileges, etc., to partially offset expense of operation.



The regulations are very complete and are divided into 78 sections. One of these requires that "before proceeding with the location, design and construction of a public comfort station or rest room, plans and specifications shall be submitted for approval to the State Board of Health." Other regulations specify the capacity, number and kinds of fixtures, construction of building, ventilation and lighting, construction of floors, walls, drains, etc. It is provided that every station shall display in a conspicuous position the standard public comfort station sign. This sign consists of a green circle five inches in diameter on the outside and one inch wide, with a white center in which is set a four-pointed, orange-colored star. This is placed on a white background with a border and lettering of a deep blue color. This emblem was designed by A. C. Shaver, plumbing inspector of Pasadena, Cal., was adopted by the American Society of Sanitary Engineering in 1912, and is now extensively used.

Considerable freedom is permitted in the design and construction of the building in which a public comfort station is to be housed, which may be of wood, brick, tile, cement blocks, concrete, stone, or similar materials.

It is provided that every public comfort station shall be open for use from sunrise to 10 p. m. every day of the week, and that the authorities shall appoint a responsible person who shall have charge of the station and visit it as frequently as is required, who shall be clothed with police power necessary for the proper fulfillment of his duties.

The sketches and plans show suggestive construction of simple buildings, pleasing in appearance, of various sizes, and also plans of details to facilitate construction of the stations by local contractors or municipal employees.

The pamphlet was prepared by the Plumbing and Domestic Sanitary Engineering Division, of which Frank R. King is engineer.

### Classification and Compensation Proposed by Engineering Council

The Classification and Compensation Committee of Engineering Council, over the signatures of Arthur S. Tuttle, chairman, and Charles Whiting Baker, secretary, on June 9 addressed a letter to the secretaries of each of approximately 100 national or local engineering and other technical societies. Formal endorsement by the governing body or by the society as a whole of the classification adopted by Engineering Council is asked, to the end that it may become generally recognized and put into effect. As to the suitability of the scale of compensation and the employment policy tentatively suggested, the committee desires an expression of views both of the societies and of individual members thereof.

Through the medium of their society publications or some other convenient means, the secretaries are requested to urge the members to report to the committee any action taken to increase compensation or to adopt the standard classification. The committee proposes to act as a clearing house for

receiving and giving out such information to any group of engineers for use in discussing these matters with authorities who have the responsibility for fixing compensation. "Through cooperative action," the committee states, "the effectiveness of the work done toward increasing compensation can be materially advanced."

To date several societies have taken action in regard to this matter. The Municipal Engineers of the City of New York on May 26, 1920, endorsed the classification and adopted a schedule providing for compensation at a rate approximately 20 per cent greater than that tentatively suggested by Engineering Council's Committee. The classification has been closely followed by the Congressional Joint Commission on Reclassification of Salaries in its recommendations concerning engineers in the Federal service. It was approved on April 13, 1920, by the Executive Committee of the American Society for Testing Materials. The Boston Society of Civil Engineers made the endorsement of the tentative schedule of compensation the subject of a letter ballot by the full membership, which is now being canvassed. Thus it will be seen that substantial progress has been made in bringing about a recognition of Engineering Council's classification as *standard*.

The committee has been reorganized and is now made up as follows: Arthur S. Tuttle, chairman; deputy chief engineer, Board of Estimate and Apportionment, 1347 Municipal Building, New York; Charles Whiting Baker, secretary, consulting engineer, 31 Nassau street, New York; Frederick W. Cappelen, city engineer, City Hall, Minneapolis, Minn.; Philip P. Farley, consulting engineer, Borough Hall, Brooklyn, N. Y.; O. C. Merrill, chief engineer, Forest Service, Washington, D. C.; C. A. Morse, chief engineer, C. R. I. & P. R. R., LaSalle Street Station, Chicago, Ill.; M. M. O'Shaughnessy, city engineer, City Hall, San Francisco, Cal.; R. S. Parsons, general manager, Erie R. R., 50 Church street, New York; and Edmund I. Mitchell, assistant secretary, 29 West 39th street, New York.

### Federal Public Works Department Referendum

In a recent referendum vote of the Chamber of Commerce of the United States, the majority of 826 against 549 were in favor of the establishment of a department of public works by the national governments, but failed to register the two-thirds majority required to carry it. The proposition for establishing a public works department by a modification of the existing Department of the Interior was lost by a vote of 675 to 679 and the proposition for establishing a department of public works by the creation of an entirely new department was lost by a vote of 282 against 992.

The Good Roads Bureau of the Chamber of Commerce of Little Rock, Arkansas, has filed a petition in a case now pending before the Arkansas Corporation Committee asking for reduced railroad freight rates on sand, gravel, crushed stone and other roadbuilding materials.

# Operating a Mechanical Filtration Plant

Instructions and suggestions covering all ordinary features of coagulation, filtering, washing the filters and other details of operation are given by a manufacturer of filters. They should be of especial service to those with little experience in operating mechanical filters.

While it may perhaps be desirable to take with several grains of salt many of the statements made by the representatives of a firm when it is endeavoring to sell its appliances, its advice as to the operation of one which has been sold and installed can be relied upon as that of an expert whose aim is identical with that of the purchaser—to get the best result the appliance is capable of rendering. For good results are the best advertisement and are decidedly for the firm's interest.

For this reason we reprint the following from "Shop and Field News," published by the employees of the Pittsburgh Filter and Engineering Co. It is entitled "Hints on the Operation of a Mechanical Filtration Plant of the Gravity Type," and should be of especial value to the superintendent or other official who has not before had experience with such plants, but will probably contain some suggestions for those also who are not novices.

In placing the plant in operation be sure that all valves controlling the flow are properly closed. In starting to fill the sedimentation basin be sure that the chemical solution feed is started first. Make it a rule always to open the coagulant supply pipe before starting the pumps that pump water to a coagulant basin. A small amount of excess solution will do no harm, while to fail to do this may result in a considerable amount of water getting into the coagulating basin before coagulation is started. It is absolutely essential to secure coagulation before getting results.

## COAGULATION

Regulation of the coagulant solution must be made in accordance with the conditions of the raw water supply and should vary probably from one grain or even less per gallon to possibly as high as five or six grains when the water is exceedingly turbid.

Judgment combined with the experience is the only way to determine the exact amount necessary to produce results.

The coagulation should appear in the form of a floc in the water, the floc taking the form of a distinct flake. This can be seen readily in the open basin with the sun shining upon the water; or have a clear glass available so that samples can be dipped from the basin and, when held up to the light, the distinct floc can be seen if the proper coagulation has been secured.

The greatest amount of the suspended matter should be precipitated in the settling basin, so that the water when applied to the filter bed is comparatively clear. This must be taken in a comparative sense only, for when the water is very turbid it, of course, will be somewhat muddy as it goes to the filter bed, but will be much clearer than the raw water.

At periods when the raw water is exceedingly clear it may be necessary to use a little larger amount of alum to secure a coagulation than when it has a certain amount of cloudiness or turbidity, for in the former case the blanket on the filter is formed entirely by the flocculant matter.

In all cases, however, be sure that you have a distinct floc as the water goes to the filter bed.

There probably will be some conditions when it would be advisable to apply the coagulant at the baffle wall in the basin or various points in mixing chamber, rather than at the inlet chamber, on account of the small amount of turbidity the water contains. When it is extremely muddy, however, application should be made always at the inlet chamber.

If you do not secure proper coagulation there is some definite reason; either a sufficient amount of coagulant has not been applied or it may be possible that, in the event of continued rains and extremely heavy turbidity, the water does not have sufficient alkalinity to properly take care of the amount of aluminum applied.

In event of a difficulty in securing coagulation, immediately have tests for alkalinity made. Each grain of aluminum applied per gallon requires about .8 of a grain of alkalinity for its proper use, and there should at all times be a surplus of alkalinity of possibly a grain and a half over that required for the coagulant.

In the possible event of a deficiency in alkalinity, temporary application of a solution of either lime or soda ash, sufficient to make it up, may be applied. Your chemist can advise you of the amount necessary after making his alkalinity test.

While it is not probable that this will occur in the water, it is a possibility, so be sure to have on hand an ample supply of coagulant, always anticipating your needs of this material so that there is no possibility of your having to operate without proper coagulation, as without it results cannot be obtained.

## FILTERING

After having filled the coagulating basin with the raw water properly mixed with the coagulating solution as it passes through the mixing chamber, open the valve supplying the influent to the filter bed, allowing the water to flow into the bed through the troughs on to the sand bed.

This should be done slowly so as not to get the bed air bound by flooding the surface and trapping the air in the sand. After slowly filling the filter box and allowing the water to rise to the level of the coagulating basin, open the filter waste for a few moments and let the first filtered water pass to the sewer, then open the filtered water or effluent valve



and close the filter waste valve to the sewer and the filter plant is in operation.

#### WASHING

The filters should be kept in operation until the loss-of-head gauges show a loss of head of approximately ten feet, at which time it will be found that the amount of water passing through the filters will be considerably less than the normal rated capacity, which should be about two gallons per square foot of area. When the capacities decrease below this quantity, then it is an indication that the beds are in such condition, due to accumulation or deposits on the surface of the sand bed, and that they require washing. It will be found, on the average, that this will take place when the loss-of-head gauge shows a loss of head of ten, and in some cases as high as twelve feet, at which time the filter should be shut down and properly washed.

In doing this, close the influent valve and allow the water to filter down until within two or three inches of the top of the sand bed; then close the effluent valve and open up the sewer valve; next open up the wash valve, letting the wash water under pressure into the under-drain system. The pressure applied to the under-drain system for washing should be approximately ten to twelve pounds per square inch, equivalent to a head of twenty-five or thirty feet, which is ample for proper washing. Too great a pressure will disturb the gravel and result in the sand drifting down to the gravel bed and into the under-drain system, gradually clogging it up.

The wash-water valve should be opened slowly, so as to get the pressure thoroughly distributed over the sand bed and permit the sand bed to rise evenly over its entire surface for several inches; then, as the pressure increases due to the opening of the valve, the sand will separate and break up, and as the valve is opened to its full capacity the velocity of the wash water increases, carrying with it the accumulated suspended matter and separating the sand grains and scouring them thoroughly, carrying the accumulated matter away with the wash water into the wash troughs and thence to the sewer.

The process of washing under ordinary conditions will require from six to twelve minutes, depending upon the condition of the bed. In closing off the wash water, it should be done gradually so that the sand will settle in regular grades according to the size, and the surface will be smooth and level at the end of the wash. No definite time can be given for washing, as it will depend upon the appearance of the wash water as to when sufficient wash will have been applied.

In this connection it is well to note that when a filter plant is first put in operation, the sand should be washed more frequently, and the washing should be of longer duration than later on when the plant is in normal operation and the sand bed is in perfect condition. It is necessary to scrape the very fine sand off the surface two, and sometimes, three times in order to get the right grade of sand left and get rid of the very fine sand. This is usually done by the erector, but it may be necessary to scrape it again later on. This very fine sand will wash up to the top of the bed and will appear almost as a mud layer, but is easily distinguished

after the washing operation has been completed. If allowed to remain in the beds, it results in extremely short runs, but of course is of no particular disadvantage otherwise, as the spaces below the sand grains are so extremely fine that they quickly fill up with deposits.

After completing the washing operation, the wash water pressure is closed off and the sewer valve is next closed. The influent valve supplying the treated water is opened and the filter allowed to fill up, then the rewash connecting to the sewer is opened for a few moments and the first water allowed to waste; this should take place in from ten to fifteen minutes; it is then closed and the effluent valve to the clear well is opened and the filter is in regular operation.

#### GENERAL

This in a general way covers the operation for mechanical parts of the operation of a filter plant. Actual results must naturally depend on observation and experience of the operator, as difference in conditions of water will necessitate different methods of treatment and handling. This means sedimentation, process of washing and the handling of the filters generally. The operator should take particular care to note the condition of the sand bed at all times and from the first evidence of any formation of any hard spots in the bed, use extremely long washing and thoroughly break up these spots with a garden rake or some other means; for if not taken care of immediately they will gradually grow larger and in time put a considerable portion of the bed out of commission, while if taken care of immediately they can readily be broken up and avoided.

They are due primarily to improper washing conditions, and this is one of the most vital points to watch in the operation of a filter plant if continued good results are desired.

The operator should take particular care to keep controllers properly adjusted and in proper operating conditions at all times, also all gauges and operating parts, in order that he may have a correct indication of what is going on in the operation of the plant. In the event of any part becoming broken, do not delay but have it repaired immediately so that it is always in shape to perform its intended function. Do not pass more water through the filter than it is designed or intended to purify except in the case of an extreme emergency.

Carefully observe the results of different treatments of the water at different stages and under different conditions so that you can form an idea of what treatment will give the most satisfactory result for each condition.

The city of Elmira, New York, having operated its own water system for five years, reports a gain during this period of \$252,177.68. During the past year the net income of the water board amounted to \$54,341.29.

Another notable fact is the reduction of rates during this time, about \$16,000 being saved to water users in the last three years. The plant has been increased \$137,000 in value by additions and improvements, thirteen miles of mains having been laid.

### Chicago's Street Railway Trailers

The first of Chicago's new trailer cars has made its appearance on the tracks of the Chicago surface lines. The car is so light that no motor was required to move it, the workmen pushing it easily out of the shop.

It is completely encircled by windows, so that it should afford cool transportation during the summer. It will seat sixty-two passengers, compared to the capacity of forty-eight of the motor car which will draw it, Chicagoan's present mode of travel. The trailer weighs less than half as much as the motor car.

It is believed that the trailer will clear the streets of waiting passengers and eliminate the discomfort of strap hangers during rush hours. If it meets the required standard of efficiency a large percentage of the 200 additional cars to be ordered by the Public Utilities Commission will be trailers.

### Boston's High Pressure Water System

A high-pressure water system that will eliminate the fire engine from the streets of downtown Boston, only hose trucks being used, is assured early operation by the signing of contracts for three pumping stations. The high-pressure pipe already laid aggregates 9.3 miles, and when completed the system will include more than 18 miles of pipe.

It is expected that 12,000 gallons will be forced through this pipe a minute at 300 pounds pressure, or approximately 18,000 gallons at the more practical pressure of 200 pounds, from four pumping stations to be operated this year. Eventually three additional pumping units will increase the volume of water to 36,000 gallons at 200 pounds pressure.

Water will be drawn from three sources—from the domestic low pressure system, high pressure feeds, and salt water from the harbor. The system, construction on which began eight years ago, will have cost between three and four million dollars when completed.

### Dublin's Concrete Quay

The largest concrete blocks ever laid are said to be those used in the construction of the north quay extension of the port of Dublin, each block containing more than 5,000 cubic feet and weighing about 350 tons. By their use it was possible to build the extension quay without costly cofferdams or extensive pumping. The blocks were made above high water level. When sufficiently set, they were lifted by a floating crane and deposited on a bed prepared by steam dredging, after which they were leveled by men working in a large diving bell, entered through a tube fitted with an air lock. Large concrete blocks were similarly placed for break-water protection and for the foundation of one of the lighthouses at the harbor entrance.

### Jamaica Bay Terminal

A. H. Greely, of Cleveland, has made an offer to build terminal facilities on Jamaica bay, New York, involving an expenditure of \$100,000,000, without any expense to the city of New York, provided the

contemplated deepening and widening of the interior channel of the bay is carried out. The Board of Estimate has appointed a committee to investigate the proposition. As yet nothing has been heard from Washington regarding the status of the bill providing for a 30-foot channel in the bay.

### National Park-to-Park Highway

A. L. Westgard, field representative of the American Automobile Association, has joined an expedition of westerners who intend to lay out a national park-to-park highway passing through seven states. Once a circuit is decided upon, there will come immediate effort to improve the roads all along the line through federal, state and county co-operation. After this preliminary trip, there will take place an official tour, starting from Denver August 25. That party will occupy some sixty days in visiting the national parks, monuments and other attractions. It is believed that if the scenic attractions in the states west of the Mississippi are connected by real roads, many citizens from the east will visit the eleven national parkways to be linked up.

### Necessary Legislation

U. S. Senate Interstate Commerce Committee has ordered favorable report on Poindexter Bill which would make a felony of any proven intent to obstruct or prevent movements of commodities in interstate commerce by persuading persons to quit work or by destroying property and would provide for punishment of persons who, through violence or threats, prevent employees from continuing work; anti-strike provision of the Railroad Bill, as added to Poindexter measure, would prohibit two or more persons from conspiring to bring about a strike that would tie up interstate commerce.

### Federal Water Power Bill

The bill which releases the water power of the nation to private development has been passed after long controversy. The Secretary of War, the Secretary of the Interior and the Secretary of Agriculture will constitute a commission which will say what sites may be developed, whether the erection of dams would interfere with the present navigability of rivers, and what the companies shall pay the government. At the end of fifty years the private companies are obliged, if the government wants the property, to sell their rights.

It is intended by this bill to make available the power for industrial development not merely in the manufacturing centers of the east, but in all parts of the west where, hitherto, the long haul for coal from eastern mines has made the building of factories out of the question. It will probably be two years before the full effect of the measure is felt.

A new New York state law restricts trucks and trailers operating outside of cities to a width of 8 feet, height of 12 feet 6 inches, and total weight of 25,000 pounds.

# Electric Pumping in Concord

Electrically driven centrifugal pump, installed last year, used an average of 525.5 kilowatt-hours per million gallons pumped, compared with 1840 pounds of coal used by the steam pump. The change to electricity permits running the plant with one man instead of two.

Concord, N. H., population about 22,000, has owned a water supply since 1872. The supply comes from Penacook Lake by gravity, but is pumped to a reservoir for high service and fire protection. This pumping was formerly done by a steam plant comprising two 2,000,000 gallon triple-expansion Worthington pumps, operating against a head of 90 feet static or 108 feet dynamic, with an average duty last year of 48,550,000 foot-pounds on a coal basis.

An electrically-driven centrifugal pump built by the Worthington Pump and Machinery Corporation was installed in the pumping station last year. This is driven by a 100 h.p., a.c., General Electric motor.

The pump is an 8-inch type "B S" slow speed, horizontally split casing, volute centrifugal pump, and was guaranteed to pump 2,100 gallons per minute against a head of 125 feet and to have an efficiency of 72 per cent, approximately, when operated by a 100 h.p. motor running at a speed of 1,800 r.p.m. The power, supplied by the Concord Electric

Co., is alternating current, 2,200 volts, 3 phase, 60 cycle.

The pressure on the suction end of pump when not running is fifty pounds, and on the discharge end eighty-seven pounds. When the pump is started the pressure on the suction drops and that on the discharge end rises, making the average net head pumped against of 122 feet.

The capacity of the pump when running at 1,800 r.p.m. against this head is 2,570 gallons per minute by Venturi meter measurement, and the efficiency is 83.9 per cent figuring the motor efficiency at 90 per cent and switchboard at 98 per cent.

The two steam pumps will be kept in good condition and used for emergency work.

All pumping by electricity is done at night at hours regulated by the Concord Electric Co., but in case of fire or other emergency the pump may be operated during the daytime.

The superintendent of the plant, P. R. Sanders,

Engine Record—Steam Pumps.

MONTH..	No. days pumping engine No. 1.	No. days pumping engine No. 2.	Total days pumping.	Total hours pumping.	Average time pumping.	Total gallons of water pumped.	Daily average pumped.	Total coal consumed.	Daily average coal consumed.	Total pounds of wood consumed.	Gallons pumped per pound of coal.
				H. M.	H. M.						
January .....	16	15	26	271:30	8:44	24,246,155	782,134	44,033	1,420	1,293	556
February .....	13	15	24	248:	8:51	22,563,427	805,836	41,940	1,497	1,292	537
March .....	12	20	26	263:	8:29	24,446,057	788,582	46,598	1,503	1,001	524
April .....	16	14	22	233:30	7:46	20,442,721	681,424	39,049	1,301	1,273	523
May .....	20	25	26	347:	11:21	30,966,687	998,925	57,176	1,844	912	541
June .....	9	26	26	312:30	10:25	28,824,428	960,814	51,703	1,723	973	557
July .....	6	27	27	285:	9:11	26,405,749	851,798	47,196	1,748	1,288	559
August .....	8	1	7	74:	9:15	6,844,133	855,516	11,975	1,446	312	571
September .....	..	..	..	.....	.....	.....	.....	.....	.....	.....	.....
October .....	..	..	..	.....	.....	.....	.....	.....	.....	.....	.....
November .....	1	1	2	6:45	3:23	619,768	345,884	1,442	721	.....	479
December .....	..	..	..	.....	.....	.....	.....	.....	.....	.....	.....
Total .....	101	114	186	2,401:15	.....	1 85,359,125	.....	341,112	.....	8,344	539
Daily Average ..	..	..	..	.....	10:10	889,027	.....	1,823	.....	.....	.....

Record of Motor Driven Centrifugal Pump.

	Total days pumping.	Total hours pumping.	Average hours pumping.	K. W. H. monthly.	Daily Average K. W. H.	K. W. H. per 1,000,000 gallons	Total gallons pumped Venturi meter.	Oil.	Packing.	Waste.	Coal heating.
		H. M.	H. M.								
August .....	22	103:20	4:29	7,560	320	462	16,318,000	1 pt.	1 lb.	1 1/2 lbs.	.....
September ..	30	128:40	4:13	10,350	340	527	19,631,000	2 "	1 1/2 "	3 "	396 lbs.
October .....	31	151:10	4:52	11,210	360	526	22,328,000	2 1/2 "	2 "	3 "	3,150 "
November ..	30	125:45	4:11	10,360	340	524	19,725,000	3 "	2 "	2 "	3,441 "
December ...	31	152:20	5:25	12,840	410	525	24,421,000	4 "	2 1/2 "	2 1/2 "	5,704 "
Total ...	144	660:45	.....	52,320	...	...	102,423,000	12 1/2 "	8 1/2 "	12 "	12,691 "
Daily average ..	..	.....	4:35	.....	360	525.5	711,270	....	....	....	100.8 "



in his annual report for 1919, says that the change from steam to electricity has enabled them to run the plant with but one man, transferring the fireman to inspection work and other duties. As it would not be economical to keep fires under the boilers for the purpose of heating the station, a small heater was installed, in which 12,691 pounds of coal was burned during the last four months of the year.

The accompanying tables show that during the first seven months of last year the steam pumps lifted 539 gallons per pound of coal (or used 1,840 pounds per million gallons pumped), pumping an average of ten hours and ten minutes a day; and that the motor-driven centrifugal pump, during the last five months, used an average of 525.5 kw.h. per million gallons pumped, operating an average of four hours and thirty-five minutes per day. (The fact that the electric pump operated less than half as long per day as the steam pump probably accounts for the fact that the dynamic head was fourteen feet greater for the former than for the latter.)

## The Bayonne Submerged Water Main\*

Laying 3,600 feet of 30-inch cast iron pipe with flexible ball and socket joints across the Hackensack River. Pipe assembled in a concave cradle 96 feet long supported between two scows gradually moved across the river to deposit the pipe in a dredged trench 40 feet wide.

The water supply for the city of Bayonne, New Jersey, is derived through a pair of 30-inch cast iron pipes which, for the 1,800 feet length of the Hackensack river crossing, are provided with ball and socket joints and laid side by side, 20 feet apart on centres, in a trench 40 feet wide which was excavated to a maximum depth of 32 feet below low water with slopes of 10 to 1 and 4 to 1. About 100,000 yards of sand, clay and mud were excavated in making the trench, which was finished with sand and clay to a reasonably smooth surface.

A wooden cradle was made in eight 12-foot sections, consisting of a pair of continuous trusses, braced together 16 feet apart and supporting between them a 2-foot 6-inch track curved to the arc of a vertical circle of 86 feet radius. The cradle, with the lower end supported on the bottom of the trench, was swung from a transverse timber connecting the tops of the derrick towers on the two scows. The scows were anchored with the centre line of the cradle aligned with rangers on shore in the axis of the dredged trench.

At the commencement of operations three lengths of pipe were assembled in the lower end of the cradle, and their joints were poured and calked and they were anchored at the shore end, the upper end having been temporarily elevated high above the

surface of the water. As additional lengths of pipe were assembled in, and lashed to the upper end of the cradle, this was lowered and the scows advanced until the top of the cradle was at the proper elevation, after which the lashings were cut and the pipe was allowed to slide off from the cradle as additional lengths were assembled and the scows moved forward.

When the first line of pipe had been nearly completed the cradle was removed by combined longitudinal and transverse motions. This overstrained the pipe, which sprung a leak, and required recalking. After recalking, the last three lengths were suspended from one derrick scow and the remaining lengths laid from the other scow. When the laying of the second line had been completed, the cradle was unbolted in the middle and taken out in two pieces without disturbing the pipe. The joints required about 155 pounds of lead each and were inspected from the inside by lowering a man from the cradle end.

The pipe was tested up to 108 pounds and developed no important leaks. It was found easily possible to repair leaks from the inside, but this took about 100 pounds of lead for each leak, and was such a slow operation that it was more profitable to repair them from the exterior with divers when two or three leaks appeared. The pipe was covered with sand three feet deep, deposited from a derrick scow equipped with a hopper and telescope pipe, enabling it to be operated with great accuracy. The pipe was laid at an average rate of about  $7\frac{1}{2}$  lengths and a maximum rate of 18 lengths per day, by a force consisting of 3 calkers, 3 riggers, 3 engineers and 4 laborers.

The bell ends of the joints were reinforced by steel tires shrunk on, and the spherical surface was machined to an accuracy of 1-32 inch. Great care was taken in handling the pipe to prevent scarring the balls and any sand holes or defects which passed inspection at the foundry were repaired by boring small holes, larger at the bottom than top, and filling them with Babbitt metal.

The work was executed by the Snare & Triest Company as contractor, under the direction of M. R. Sherrerd, consulting engineer.

### Predecessors of Chicago's New Bascule

Chicago's new bridge connecting the northern and southern parts of the city, is the ninth successive river link established at this site. The first recorded means of transportation was a canoe. This was followed by a rope ferry, which in turn was succeeded by a floating bridge, hinged to the bank. When the latter, in 1852, swamped while being drawn in to allow a ship to pass, the settlers returned to the rope ferry, until this in turn met with an accident, being fouled by a ship and causing the death of several people. The next venture, a swinging bridge of wood and iron, costing \$54,000, collapsed in 1863, when a substitute bridge tender attempted to swing it while 150 head of cattle were crossing. A wooden bridge was next erected and lasted until the fire of 1871. A steel bridge, costing \$115,500, was used twelve years before coming to grief when several ships attempted to pass through the south draw at one time. The bridge

\*Abstract of paper by F. H. Sherrerd, published in Journal of American Water Works Association, May, 1920.

succeeding this one still stands, but will be torn down this summer.

The new bridge is a double deck bascule. When the draw is opened for passing ships the two "leaves" rise 150 feet into the air. A broad boulevard leading to the upper level is reserved for pleasure vehicles, while the lower passageway is used by trucks and drays. More than twenty years were spent in planning the construction of this bridge, whose cost approximates \$16,000,000.

## Cumberland Valley Railroad Bridge

The new bridge carrying the Cumberland Valley Railroad across the Susquehanna river at Harrisburg has 44 concrete arch spans of 74½ and 77 feet and clear length between piers and was built by the Robert Grace Contracting Company of Pittsburgh.

For construction purposes, a pile trestle was built alongside the bridge and on it was installed a service track for the delivery of materials and for handling plant and equipment. This track was about 10 or 12 feet above ordinary water level and nearly 40 feet below the top of the parapet.

Concrete was mixed on shore and delivered over the service track for both piers and superstructure. One half of the piers, being substantially duplicate, were concreted in Blaw riveted steel forms, shifted from pier to pier as the work advanced.

For the construction of the arch spans, several sets of riveted steel arch center trusses were fabricated by the Blaw Company (now Blaw-Knox Company) and were shifted from span to span and used over and over again so as to secure maximum rapidity and minimum total cost, superior to what it was estimated would be afforded by the use of wooden centering.

The arch trusses were all made to fit the 74½ foot spans. Each consisted of two segmental semi-trusses with curved top chords and inclined straight bottom chords, connected together at the crown and by a horizontal tension member at the second panel point from the lower ends of the bottom chords.

These trusses were braced together in sets of four and to the top chords was attached the transverse wooden lagging on which were built the wooden forms for the arch ring. The lower ends or skew-backs of the arch trusses were adjustably supported on transverse timber sills set close to the face of the upper part of the piers.

After the concrete in the arches was sufficiently set, the arch center trusses were lowered to bearing on rollers and were pushed transversely from under the bridge, on to supports on trucks spotted opposite to them on the service track; after which these trucks were pushed forward by a locomotive crane to the required position between piers in advance, while the operations were reversed, and the sets of trusses, together with the lagging connecting their top chords, were moved into position between the piers and adjusted to receive the concrete for the arch in that place, and so on, until the last span was completed.

<sup>2</sup>See illustration on front cover.

Adjustment was made to fit the intrados of the 77-foot spans by driving thin wooden blocks between the flanges of the top chords of the arch trusses and the nailing strips to which the lagging was spiked.

The semi-arch trusses were assembled at the site and erected in position by the locomotive crane, which also handled the heavy steel forms for the piers and the wooden forms for the spandrel walls and buttresses.

The locomotive crane also handled the buckets of concrete from the service track to the forms and, in order to swing over the top of the spandrel wall, it was equipped with a special boom having a straight lower portion about 50 feet long, extended by a piece about 15 feet long spliced to its extremity at an angle, and guyed at the splice by back stays to the bed of the crane. When the lower part of the boom was topped up to a nearly vertical position, it could be swung close to the face of the spandrel wall and allow the inclined upper end to project over the roadway, which could not have been accomplished with a straight boom of practicable length operated from the service track.

## Revised Freight Rates for Construction Materials

There are now before the Interstate Commerce Commission, applications for permission to increase railroad freight charges. If these applications are granted, the changes in carriage should be so formulated as to correct the inequalities and discriminations against construction materials that have developed since 1914.

In order to present the case in favor of construction interests most clearly, the National Federation of Construction Industries, Rexall Building, Philadelphia, has issued a circular letter requesting all associations that wish to present arguments to the commission in a forthcoming hearing, to immediately obtain data showing the inequalities in freight rates which now obtain with commodities in which they are interested. They are therefore desired to communicate immediately with the federation and state if they desire to participate in the hearing for which the federation has petitioned.

After reciting some of the adverse conditions under which the construction industries have suffered, the federation, under date of June 10th, has petitioned that, should the commission decide to grant the applications of the carriers for increased revenues through increased freight rates, but before such schedule is made effective, the commission should arrange for the federation and such of its constituent associations as may desire to be heard, to present to the commission their data and arguments relative to the transportation cost to be placed upon their respective construction materials.

In order to cooperate with the senate special committee on reconstruction and production, the federation has appointed a special committee composed of B. F. Affleck, Chicago; Philip Gadsden, Philadelphia, Pa.; John L. Kaul, Birmingham, Ala.; Charles F. Lang, Cleveland, O.; Gen. R. C. Marshall, Jr., Washington, D. C.; W. T. Rossiter, Cleveland, O.; J. Willison Smith, Philadelphia, Pa.; and Robert C. Wright, Philadelphia, Pa.

# PUBLIC WORKS.

Published Weekly at  
Floral Park, N. Y.

by  
Municipal Journal and Engineer, Inc.  
Executive and Editorial Offices at 243 West 39th Street,  
New York, N. Y.  
Address all communications to the New York Office.

## Subscription Rates

United States and Possessions, Mexico and Cuba.....\$3.00 per year  
All other countries .....\$4.00 per year  
Entered as second-class matter January 3, 1906, at the Post Office  
at New York, N. Y., under the Act of Congress of March 3, 1879.

## Change of Address

Subscribers are requested to notify us promptly of change of address, giving both old and new addresses.

Telephone (New York): Bryant 9591  
Western Office: Monadnock Block, Chicago

A. PRESCOTT FOLWELL, Editor  
FRANK W. SKINNER, Associate Editor

## Highway Work Potospined

At least five states have decided to attempt no new highway work this year, in spite of the millions of dollars which are available for such work. Both these and other states have advertised such work amounting to hundreds of millions of dollars, but part of it received no bidders, and for other parts the bids were considered too high to warrant acceptance. Many contracts which have been let are lagging or have been stopped completely because of inability of the contractors to perform the work.

The outlook for a large mileage of highway construction this year is very poor at present.

In discussing this from the contractor's point of view W. A. Rogers, president of the Associated General Contractors of America, attributes this unsatisfactory condition largely to three factors—transportation, material prices, and scarcity and inefficiency of labor.

Several large contracts in the vicinity of New York have been discontinued for several weeks, because of the inability of the contractors to obtain cement, asphalt and other materials. In these and some other instances, at least, neither labor nor high prices have interfered with performing the work, although they have undoubtedly greatly reduced the amount which has been undertaken.

It would appear therefore that the most urgent need is for better transportation service by the railroads. Just how this can be attained or where lies the blame for the grossly inadequate service is difficult to say. The different ones on whom the blame is placed from time to time invariably "pass the buck". The railroads say that they have only half enough freight cars and that, unless they can obtain a much larger income by increase of rates, it will be impossible for them to increase their equipment. It would seem as though a reply to this might be made that, if they would increase their equipment, they could easily double their income at the present rates by carrying double the amount of freight, which is appealing for transportation.

There is a suspicion that the railroads are at least making no great effort to remedy this transportation crisis, in the hope that such crisis will influence the Interstate Commerce Commission to permit them to increase the rates. Also, it is suggested that the

present equipment could be used much more effectively and by it much more freight could be handled if the railroad employees in yards and terminals (and possibly elsewhere) were increased in number, their ranks having been considerably depleted by the strike of a few weeks ago. Here again the theory is advanced that the railroads are not making any great effort to replace the vacationists, on the theory that the greater they can make the discomfort of the people through traffic insufficiency, the more promptly and fully will the Traffic Commission yield to their demands for increased rates.

## Inefficient Transportation

The Associated General Contractors have just sent out a questionnaire to its members with a view to urging upon the Interstate Commerce Commission that priority be given to construction materials over all other commodities except food and fuel. "Under the present rulings, construction materials are forced to compete with luxuries and the least essential commodities for transportation service." With a view to securing exact data for enforcing the arguments of the association, secretary G. W. Buchholz asks each contractor to send to his office information concerning any work delayed on account of car shortage, with the approximate value of each contract, what types of cars are needed, how many daily, and points of shipment and delivery, and what percentage of their requirements for cars have been received during the previous ten days.

Other pleas for the granting of preference to materials for highway construction are that the very fact of the overloading of the railroads, is a strong argument in favor of highway construction, since trucking on the highways would supplement the short-haul business of the railroads.

Contractors of course are not the only sufferers by this condition. The paving brick manufacturers have issued a statement that they find it impossible to ship paving brick; that the yards are becoming overstocked with brick which, whether ordered or not, cannot be shipped out; and that, unless the condition improves at once, many plants will have to shut down, and both paving brick and the brick paving industries will suffer severely.

Whatever the cause and whatever the remedy, there can be no dispute that there is a serious crisis in the transportation system of the country, and all who are in any way able to advance in any degree the improvement of the service should consider it their patriotic duty to do so.

## Labor Scarcity

As to labor, there is still a scarcity of that, although immigrants are coming in greater numbers than was the case a few months ago. There is still a considerable shortage in many sections of the country, however, and if the transportation situation should improve so that materials could be available for the large amounts of work that are awaiting prosecution, the labor problem will undoubtedly come to the fore as very serious.

The idea of introducing Chinese labor is still being urged, especially for the Middle and Far West.



A number of California contractors have informed us that they are heartily in favor of introducing such labor into this country under certain conditions. One of them states that he is in favor of it, providing laws be passed prohibiting Asiatics from obtaining citizenship or owning or leasing land, this contractor being also a farmer and having found that the Chinese use a form of sabotage for discouraging farm proprietors and acquiring their land.

One cause of labor shortage is the fact that many of the laborers now in the country refuse to work, for one cause or another. The high wages which have been received during the past year have enabled many of them to remain out of employment for longer periods than would otherwise be the case, in their effort to secure higher wages, shorter working hours, recognition of the union, or other demands through the weapon of the strike. Add to this the fact that in many lines of work the hours have been shortened and the efficiency lessened because of this feeling of independence, and the labor problem is seen to be a very real one. One thing is certain, when the transportation situation improves, the labor shortage will take its place as the most serious matter confronting the people.

### Protect the Strike-Breakers

If the New York strikers make, as there has been reason to fear they will, violent efforts to prevent the operation of the citizens' transportation committee's trucks that have been provided by the \$5,000,000 fund to maintain commerce here, any disorder should be instantly and vigorously repressed by the police; and if, as in previous times, they prove unwilling or inefficient, Governor Smith should be prepared to immediately follow the example of Governor Hobby of Texas, who ordered 23 troops of dismounted cavalry and 3 machine gun companies to the Galveston docks to protect labor and property from the strikes there.

### To Increase Construction Transportation Facilities

The recent and present delays and inadequacies of railroad transportation facilities have brought about priority rulings by the Interstate Commerce Commission which discriminate against construction materials, virtually putting the latter in competition with luxuries and less essential commodities. As a result, construction is in many localities already nearly paralyzed and, in order to help it, the Associated General Contractors of America has issued a questionnaire, the answers from which will be referred to the authorities at Washington with the hope of securing some recognition of the right of construction materials to transportation subordinate only to food and fuel.

This action is likely to have considerable weight with the Commerce Commission and it is desirable for contractors, builders, dealers, owners, engineers, architects and others that are interested and who are in possession of authoritative data, should fill out the questionnaire and forward it, whether or not they are members of the association.

#### QUESTIONNAIRE

Recognizing that the shortage of transportation facilities is acute, and assuming that food and fuel must be given preference in order to feed the country and maintain industry—

Do you favor an effort on the part of the A. G. C. to secure priority for construction materials over less essential commodities?

What conditions or facts in your locality prove the need for giving construction materials preference above all other commodities other than food and fuel?

Is your work being delayed on account of car shortage? Please give actual contracts with approximate value.

What type of cars are needed? How many daily? Where?

Point of shipment

Railroads

Point of Delivery

Open top No. daily

Box cars No. daily

What percentage of cars as compared with your requirements have you received in past ten days?

Remarks:

### Beverly R. Value

Beverly R. Value, president of the General Contractors' Association of New York, died in New York City, June 10, at the age of 57. He was a member of the class of '84 in the Columbia School of Mines, and successively served on the engineering staff of the New York Aqueduct Commission, the construction of the new Croton dam, as division engineer on subway construction for the New York City Rapid Transit Commission, as chief engineer of the Electrical Development Company and construction of the Hydro Electric Plant at Niagara Falls, and of the famous McCalls' Ferry Power Company and for a similar plant on the Susquehanna River, and for the past 12 years has been chief engineer, comptroller and director of A. S. Kerbaugh, Inc., the Empire Engineering Corporation, and the Kerbaugh-Empire Company, and has been secretary, treasurer and director of Geo. W. Rogers & Company. He was an able executive, had great experience on heavy construction work, and was particularly successful in the selection, installation and operation of heavy plant and equipment.

### Sound Labor Union Advice

In an address at Manchester, N. H., May 17, before the consolidated labor organizations of that city, Grenville S. MacFarlane, of Boston, declared that "In America many of your national labor organizations have degenerated into political machines quite incapable of real political power to the workmen, but quite invincible in keeping some labor leaders in office without convincing reasons for their continuance in power."

"While the leaders are acknowledged and are given the power to make contracts, those contracts ought to be honored. The way to change leadership and repudiate it is not to repudiate honorable obligations with the third parties."

# Mechanical Equipment for Highway Construction I.

The author describes various appliances and uses of them for unloading aggregate from cars, for bringing it to the mixer, and for mixing it

With larger amounts of money becoming available for highway construction, there is coming to be a demand for the construction of highways by miles instead of by feet. In Illinois in the past the average mileage completed per construction unit has been less than three miles per working season, and this experience was apparently borne out again in 1919. This condition is general throughout the country, and it does not apply to Illinois alone.

Many contractors have been able to place seven miles of road per season using small equipment, and G. P. Scharl, with large equipment, placed fourteen miles last year. However, these are exceptional performances. Two causes are responsible for the low average. First, the contracts have in the past been awarded so late in the season that there has been no possibility for the contractor to complete his work the first year; and, second, both contractors and engineers have thought in terms of square yards instead of in terms of miles of completed work. But there is available for highway construction work in 1920 approximately six hundred and fifty million dollars, almost three times as much money as was available for 1919 and five times as much as has been available in any other year. Construction men are, therefore, face to face with development of organizations and methods which will allow the expenditure of this money both economically and rapidly.

While this demand was materializing, laboratory investigations showed that uniformity of concrete throughout the paving slab was essential and that to get this uniformity it was desirable to hold the concrete in the drum of the mixer for at least one minute. Whereas the contractor had previously expected to turn out from fifty to sixty batches per hour, depending on his ability to charge the mixer, he was now cut down to twenty-five or thirty batches an hour. Studies of fast operating mixers showed that the usual time required for charging is 10 seconds and for discharging approximately 10 seconds, and therefore, that the number of batches might be increased from twenty-five to forty batches per hour, provided there was no lost time incident to the unloading of the mixer. The reduction of output was usually aggravated by unsystematic organization of the crew. The mixer was loaded with wheelbarrows, the material was not piled on the sub-grade with any particular attention for minimum handling, and the mixer operator was not instructed in the rapid handling of the machine and in taking advantage of the possibility of starting to raise the loading skip before the material was entirely discharged from the drum.

It is not within the province of this article or, in fact, within the province of an equipment manufacturer, to discuss costs of doing work or relative costs with given equipment but only to discuss different types of equipment and their economical use. Each job brings up its own problems and must be laid out according to the type of plant used. In the past, however, there has been a tendency on the part of contractors to wait until they receive the job before they decided on the type of plant to purchase. The progressive contractor, however, has changed his point of view and is today purchasing equipment of a type which he feels will give him the best satisfaction and then bidding on jobs accordingly.

## UNLOADING THE MIXER

Increased output demanded three things: first, that the crew be organized; second, that special loading equipment be used; and third, that a larger mixer take the place of the smaller ones in order that the time the material is held in the drum may become a small factor in controlling the day's output.

Economical organization of the crew is dependent, first, on the men themselves, second, on the reduction by time studies of the number of men, and third, on the replacement of men by machinery.

The first change in machine design looking to more rapid charging of the mixer was the widening of the charging skip to accommodate two wheelbarrows at one time. This proved a great help, but still it required wheelers and the output was dependent on the ability to keep the skip loaded. Replacement of men by machinery came with the manufacture of the belt conveyor loader. This consists of a steel frame 60 ft. long, running on traction wheels and operated by a 5 h.p. gasoline engine. Standardized boxes furnished with bottom dump doors insured proper quantity of aggregate per batch. On this frame a woven belt 22 in. long and traveling at the rate of 450 ft. per minute serves to carry the materials forward and place them in the loading skip. Wheelers are no longer required. The number of men in the organization is reduced by six or eight, depending on the size of the machine. No more is there a tendency for the crew to become disorganized, for each man has particular work to do to keep the cycle of operation functioning with clockwork regularity. The minute the charging skip touches the ground the material is dumped through the hoppers onto the belt and 20 seconds later the charging skip is again ready to be raised. In other words, the machine has become a pace-maker for the crew.

For some years there has been a tendency toward the use of the industrial railroad for hauling

\*From paper before the Ohio Engineering Society.  
†Of the Koeching Machine Co

materials in the construction of highways. Among the earlier methods was the use of standard 2-ft. gauge cars dumping into a sideloading mixer. This, however, did not fit the requirements as, in the first place, the track was not always at the same relative elevation as the mixer and, in the second place, it was not possible, with the size of the machine, to get full capacity out of the industrial equipment. The batch box system was, therefore, developed and has the advantage of allowing the industrial railroad to be operated to full capacity. The mixer was equipped with a derrick in order that the box might be swung over the loading skip and there discharged.

In the discussion of cars and track, consideration should be given, first, to the design, second, to the number of boxes to a car, third to the use of "V" shaped cars instead of boxes, fourth, to the use of bottom dump instead of tip-over boxes, and fifth, the necessity for quick-acting equipment in order that full capacity may be obtained from the mixer.

Road contractors have generally accepted the standard 2-ft. gauge cars manufactured by the industrial car manufacturers using frames without platforms and placing the boxes directly on the frame. For mixers holding 14 and 21 ft. of mixed material, the use of two boxes to the car has proven the most satisfactory, as this gives full capacity from the standard 1½-yd. industrial car.

For the larger mixer, 28-foot capacity, only one batch box should be used per car, as the strength of equipment and the weight of rail will carry one batch box satisfactorily, but not two.

The use of "V" shaped cars loaded to capacity, with one aggregate dumped directly onto the sub-grade, the materials then being rehandled to the mixer by use of the mixer loader has many advantages. The system obviates the possibility of tie-up because of breakdown of a portion of the plant at the loading station, or of transportation equipment and allows good storage of material insuring the concrete crew to work with regularity. With the materials for the concrete placed on the sub-grade, the system is more elastic than is the one using the batch box. It is also probable that with a given machine more yardage will be placed by dumping aggregates on the sub-grade and rehandling than if the quantity placed is dependent on the ability of the contractor to keep a steady supply of material moving to the mixer with the batch box system. However, there is the additional cost of rehandling this material, which doubtless offsets any reduction in cost per yard due to increased profits. The batch box system has the added advantage that the total number of men in the crew is reduced.

Some mention should be made of the three types of batch boxes that have been used during the season. They may be divided according to their method of discharge into, 1st, tip-over boxes, 2d, side-dump boxes, and 3d, bottom-dump boxes. The tipover box design utilizes a "V" shaped car body or has a rectangular batch box with trunnion below the center of gravity of the load, to which the yoke attaches. In order that the cement may be measured in bulk the "V" shaped body has been divided into three parts by placing a sheet metal box of the proper shape and volume in such a position in the

body that the compartments are found in which the volume of fine and coarse aggregate is measured at the same time. In other words, the body or box is divided into three distinct compartments, one holding cement, one sand and the other stone. Two objections have been offered to this type of box, first, that the cement compartment does not clear readily, and second, that the tipping of the box results in a back kick making it difficult to hold the box in place.

The side-discharge box has the advantage of throwing the material well to the front of the loading skip but has the disadvantage of slow discharge and tendency to kick back. There is no opportunity to separate the cement from the aggregate and unless the bottom slope of the box is considerable, the materials will not flow readily. The sloping of the bottom requires a larger box and also places the center of the load higher and to one side.

The consensus of opinion is that the bottom-dump box equipped with a separate cement compartment most satisfactorily fills the requirements both for the 14 and 21-ft. paver, where the boxes are dumped by hand, and for the 28-ft. paver where they are dumped by power. With this type of box there is no back kick when the materials are discharged.

Some question has been raised as to the relative advantage of wood and steel boxes. The steel boxes are probably somewhat lighter and nicer to handle when they are new, but once they have become bent they are hard to straighten. The wood box, on the other hand, can be easily repaired, and in case of a wreck a few new boards and a carpenter will quickly have them in working condition.

The season's work has shown the great advantage of picking the boxes from the car with a derrick on the mixer, taking advantage of the vertical lift offered by picking them with a full line instead of obtaining the necessary rise by lifting the boom. The advantages of this method are first, it is not necessary that the cars be spotted so carefully, as they can be brought to place by tightening the cable; second, the relative elevation of boxes and mixer is not a factor in the operation, as there is sufficient line to lower boxes 3 ft. below the elevation of the machine if desirable; third, the derrick is quick acting, there being no delays to the operation of the charging skip while waiting for the yoke to be hooked in place.

Consideration should be given to the use of motor trucks instead of industrial railroad and also the use of tractors and trailers. No general conclusion can be reached on the relative advantage of these two methods of handling materials without knowing the local conditions that exist on a particular job. Motor trucks are entirely out of their class in heavy mud. On the other hand, the industrial track must be ballasted in order that the trains may run with necessary speed. If motor trucks are used, it is necessary that delays in loading and unloading be reduced to a minimum, as with a rental of \$35 a day even short delays are expensive.

A proposition is before Congress for the provision, in successive years, of a total sum of \$350,000,000 for the reclamation of unused lands in the west and south.



# City Planning Literature

## READY REFERENCES FOR THE SHELF OF A CITY PLANNING COMMISSION

Selected by THEODORA KIMBALL, Librarian, Harvard School of Landscape Architecture Honorary Librarian, American City Planning Institute.

NOTE: The file of *Proceedings* of the National Conference on City Planning (1910-date) is a most valuable source of information on many topics. The separate papers are noted under subjects in *Selected Classified List of References on City Planning*, by Theodora Kimball, published by the Conference, (60 State St., Boston) 1915,—a bibliography of about 1,000 titles, covering the whole field. To supplement this, the Conference and American City Planning Institute are now planning for the publication of an up-to-date *Manual of References on City Planning*, to comprise largely American references of particular use to practitioners and students. To obtain a complete list of city planning reports for cities in the United States, three publications must be consulted: "*American City*" Pamphlet No. 124 (Tribune Bldg., New York City), covering to December, 1914; lists in *Landscape Architecture* (15 East 40th St., New York City), quarterly, January, 1918, and January, 1920, covering 1914 to date.

While there are many publications which would be advantageous for a city planning commission to have at hand, the following short list has been selected, after consultation with various members of the American City Planning Institute, as offering a good start on some of the most important lines of information, and as representative of current practice.

### GENERAL

LEWIS, NELSON P. The planning of the modern city. New York, J. Wiley & Sons, 1916. 423 pages. Illustrated. Plans. Price \$3.50.

Lays especial emphasis on American facts and experience.

NOLEN, JOHN. New ideals in the planning of cities, towns, and villages. New York, American City Bureau, 1919. 138 pages. Illustrated. Price, paper, 50 cents; cloth, \$1.00.

An introduction to the subject.

NOLEN, JOHN, *Editor*. City planning; a series of papers (by seventeen experts) presenting the essential elements of a city plan. New York, D. Appleton & Co., 1916. 447 pages. Illustrated. Plans. (National Municipal League Series.) Price, \$2.00.

ROBINSON, CHARLES MULFORD. City planning, with special reference to the planning of streets and lots. New York, G. P. Putnam's Sons, 1916. 344 pages. Illustrated. Plans. Price, \$2.50.

Of especial importance in relation to the planning of residential districts.

SHURTLEFF, FLAVEL, and FREDERICK LAW OLMSTED. Carrying out the city plan; the practical application of American law in the execution of city

plans. New York, Survey Associates, 1914. 349 pages. (Russell Sage Foundation Publications.) Price, \$2.00.

Deals with administrative and financial as well as legal problems. Should be supplemented by papers and questionnaire results: The constitution and powers of a city planning authority, in *Proceedings of the National Conference on City Planning*, 1915, and by later facts given in Mr. Lewis's book mentioned above.

ZUEBLIN, CHARLES. American municipal progress. New and revised edition. New York, The Macmillan Company, 1916. 522 pages. Illustrated. Price, \$2.00.

A summary of civic improvement.

### SPECIAL SUBJECTS

BASSETT, EDWARD M. Zoning. Supplement to National Municipal Review (North American Building, Philadelphia), May, 1920. Vol. 9, No. 5, p. 311-341. Price, 25 cents.

References to opinions of the Courts given. Also contains Bibliography of zoning, prepared by T. Kimball. A propaganda bulletin on Zoning, compiled and published by the American Civic Association (Union Trust Building, Washington, D. C.), is now in press and will shortly be obtainable. It contains papers and addresses by Lawson Purdy, Edward M. Bassett, Herbert S. Swan, Harland Bartholomew, and Andrew Wright Crawford. The American City Bureau, New York, will issue in Fall, 1920, a Digest of Zoning Experience in the United States, prepared by Charles H. Cheney, Alfred Bettman, and Theodora Kimball.

COMEY, ARTHUR COLEMAN. A schedule of civic surveys. May, 1916. 16 pages. (Massachusetts Homestead Commission, Bulletin No. 5.) Free.

HUBBARD, HENRY V. The size and distribution of playgrounds and similar recreation facilities in American cities. Boston, National Conference on City Planning, 1914. 23 pages. Price, 10 cents.

Reprinted from the 1914 *Proceedings of the Conference*.

Practical street construction; planning streets and designing and constructing the details of street surface, subsurface and supersurface structures. Reprinted from a series of articles which appeared in *Municipal Journal* during the year 1916. New York, *Municipal Journal and Engineer*, 1916. 248 pages. Illustrated. Plans. Price, \$2.00.

Rochester (N. Y.) Bureau of City Planning. Rules and regulations relating to laying out, dedication and acceptance of streets, etc. Rochester, 1919. 10 pages. Free.

Platting regulations have also been issued in convenient form by Portland, Oregon, and Revere, Mass.

SOLOTAROFF, WILLIAM. Shade-trees in towns and cities; their selection, planting, and care as applied to the art of street decoration, their diseases and remedies; their municipal control and supervision. New York, John Wiley & Sons, copyright, 1911. 287 pages. Illustrated. Plans. Price, \$3.00.

This book should be supplemented by Bulletin No. 816 of the United States Department of Agriculture; Street trees, by F. L. Mulford; and by a summary statement of the principles of public plantings, by John Nolen: Trees and other public plantings, in *Landscape Architecture*, quarterly, April, 1920.

United States. Bureau of Industrial Housing and Transportation. Report of the United States Housing Corporation. Vol. II. Houses, site planning, utilities. Washington, Government Printing Office. 524 pages plus 19 pages. Illustrated. Plans. Price \$1.50.

The most comprehensive collection of American data on low-cost housing developments. First edition exhausted. To be reprinted.

WILLIAMS, FRANK BACKUS. Akron and its planning law. Akron, Chamber of Commerce, 1919, 40 pages. To be reprinted at a nominal cost.

The most useful recent summary of the law in the United States relating to city planning. The author has in preparation a comprehensive work on American city planning law.

## Concrete Block Vehicular Tunnel Investigated

Summary of reply by Chief Engineer of Tunnel Commissions to the Goethals report on the concrete block type of construction. Takes exception to assumptions, data, analysis, and estimate and renews former objections.

In reply to the April 2d report\* by General George W. Goethals defending the concrete block type of construction for the Hudson River Vehicular Tunnel, C. M. Holland, chief engineer for the New York and New Jersey Tunnel Commission, has reported at length to the commission discussing the different points made by General Goethals and expressing strong opposition to and contradicting some of them. He maintains the stand taken in his original report of February 28 on the points in controversy, and makes specific statements regarding the mathematics and analysis of the problem, but does not give space there to computations or demonstrations.

We give here the conclusions, very slightly abstracted.

Summarizing:

(1) General Goethals abandons his first plan for a tunnel and substitutes in this connection a plan for twin tubes.

(2) He further proposes a method for the receipt of bids which is entirely impracticable and impossible.

(3) He changes his plan of width of roadway, but adheres to the type of construction previously proposed, namely, concrete blocks.

(4) No detail estimate is given on which judgment can be based or the results determined as to how twin tubes of 38 feet 6 inches diameter can be built at a cost less than two twin tubes of 29 feet in diameter.

(5) General Goethals in the tunnel proposed, still adheres to what is claimed to be a three-line width of roadway, but this is modified by his own statement that, under certain conditions, there would be but two lines of travel.

(6) General Goethals' analyses are based on false assumptions, and his conclusions are worthless.

(7) Altogether, the letter in question, while it changes, as has been shown, the type of tunnel recommended and therefore is an abandonment of all that has been previously recommended by General Goethals, contains the same method of drawing conclusions, not from work which has been done, but basing statements of fact on assertions made by a contractor. \* \* \* Attention is

still called to the fact that comparison can not be made between a carefully worked out plan based on the result of the experience derived from the actual building of tunnels, with irresponsible statements of an interested contractor striving for effect.

General Goethals, in conclusion, states that, "The paramount question still remains; will your Commissions, simply because fearful of attempting something which heretofore has not been tried out in its entirety, recommend the expenditure of 26 to 30 millions to create facilities for vehicular crossing of the North River, when 10 to 12 millions less than this amount will accomplish the desired end" \* \* \*

The Chief Engineer and the Board of Consulting Engineers of your Commissions \* \* \* feel that in difficult subaqueous tunnel construction and in solving problems of tunneling, their experience and judgment should be entitled at least to as much weight as those of an engineer who has had practically no experience of this nature or of a contractor who has his own purpose to serve, and in addition, it should be remembered that the responsibility for the successful outcome of the project primarily rests on the shoulders of your engineers.

On one side the Commissions have before them a carefully prepared plan and estimate, and on the other side, a statement from General Goethals which he confesses is based on assertions of cost given by a contractor for a method of construction which has never been used under conditions similar to those which are to be encountered in building a tunnel under the Hudson River. No basis has ever been submitted to the Commissions by which they could judge in any way of the adequacy of the figures which have been given. There can be no fact, no assurance, because the methods proposed are entirely unknown and have never been used under conditions governing the construction proposed, and are altogether in a field of conjecture and outside of any definite experience in subaqueous tunnel construction; and the assertion that the proposed methods of construction would save 10 to 12 millions can be accepted, if it is desired, but a study of what has been submitted leads your engineers to maintain that, not only would 10 to 12 millions not be saved, but that whatever money was expended in this experiment would simply be wasted, and the whole undertaking would end in disaster.

### Whitfield P. Pressinger

WHITFIELD P. PRESSINGER, New York, vice president, Chicago Pneumatic Tool Company, died June 10th as a result of complications following an operation. Mr. Pressinger was actively engaged in the pneumatic tool and allied machinery industry for many years. He was general manager of the Clayton Air Compressor Company for seven years and became widely known through numerous activities in the American Society of Mechanical Engineers and the Compressed Air Society. He was born in New York City in 1871.

\*Abstract published June 19, page 549.

# Recent Legal Decisions

## CONTRACT AGAINST COUNTY FOR ROAD WORK

A contract for roadwork between a county and road contractors was an indivisible contract, although it provided for estimates as the work progressed, and for the issuance of time warrants upon such estimates. The Texas Court of Civil Appeals holds, *Cobb & Gregory v. Parker*, 216 S. W. 214, that the contractors, by presenting a claim for the final and full amount due under the contract and obtaining action thereon by certain commissioners acting as the county court or attempting so to act, allowing a certain amount as balance due, settlement in full, and subsequently instituting and prosecuting to judgment a claim for this particular amount as the balance due under the contract, whether they had success in recovering that amount or not, made an election to claim such sum as the balance due under the contract in full, and they could not again sue to compel the county court to issue warrants applied for on certain estimates made as the work progressed.

## MODIFICATION OF CONTRACT

(Minn.) Where plaintiff, a subcontractor for painting for \$1,000 after part performance, was obliged to stop because work on the building was stopped without his fault, and was forced to file lien to protect his rights if work was not resumed, and did the last work during the busy season instead of the slack season, as originally intended, there was a sufficient consideration for the modification of the original contract price from \$100 to \$125.—*W. K. Morrison Co. v. Slonzynski*, 175 N. W. 992.

(Mont.) A written contract supersedes all oral stipulations of the parties.—*Helena Light & Ry. Co. v. Northern Pac. Ry. Co.*, 186 P. 702.

(N. C.) Where a contract is written, all previous negotiations of the parties are conclusively presumed to have been merged in the contract.—*Patton v. Sinclair Lumber Co.*, 101 S. E. 613.

(Tex. Civ. App.) In subcontractor's action against road contractor for damages for inability to perform contract because of failure of contractor to furnish gravel, question of whether contractor orally agreed with subcontractor to furnish and have on hand sufficient gravel wherewith subcontractor was to do work held for jury.—*Hartwell v. Fridner*, 217 S. W. 231.

## QUESTION OF TRANSFER OF TITLE OF SUBCONTRACTOR'S MATERIAL

A written contract was made between a board of education and a contractor for the erection of a school building. The contract contained a covenant that if the contractor defaulted the board could enter and take all materials on the ground and use them in the completion of the building. The contractor sublet a part of the work to another, who shipped the material he expected to use, to his own order to be delivered on the premises; and it was delivered. Before the subcontractor used the ma-

terials the original contractor defaulted, and the school board took possession of the subcontractor's materials and used them to complete the original contract. The only evidence of transfer of title to the contractor was the delivery of the materials on the ground in the manner above set out, and the fact that the subcontractor had charged on his books of account the amount of the entire contract price to the contractor. In an action by the subcontractor's assignee against the school board to recover for the materials so taken and used, the New Jersey Court of Errors and Appeals holds, *Jacobi v. Board of Education of Morristown*, 109 Atl. 345, that these facts did not permit an inference that the subcontractor had passed the title of his materials to the contractor so as to subject them to the terms of the principal contract. The plaintiff was therefore entitled to a direction of verdict as the case then stood, and it was error to submit the question of title to the jury.

## RIGHTS OF LABORERS AND MATERIALMEN UNDER CONTRACTOR'S BOND

The surety on a state contractor's bond for the performance of a building contract, which takes an assignment of all moneys payable on the contract, containing a stipulation that sums due thereon might be retained and applied to claims for labor and materials, can claim nothing by the assignment which is inconsistent with its obligation under the bond. Where, therefore, it assumes the contract and completes it at a loss, the laborers and materialmen have an equitable right to payment of claims for labor performed and material furnished prior to the contractor's default, out of funds retained, superior to the surety's right. *U. S. Fidelity, etc., Co. v. Marathon Lumber Co.*, Mississippi Supreme Court, 81 So. 492.

## PROTECTION OF LIEN CLAIMANTS UNDER PUBLIC IMPROVEMENT CONTRACTS

An Indiana statute of 1914 requires public officers and boards contracting for public improvements to withhold full payment until subcontractors or laborers have been paid, and requires such claims to be filed within thirty days after the completion of the work. The Indiana Appellate Court holds, *State v. Puckett*, 123 U. E. 650, that this statute confers no right of action on any one unless the public officer wrongfully fails to withhold money due the contractor which should have been applied to claims previously filed. Therefore a complaint in an action by the sureties of a public contractor against a township trustee to recover for an alleged wrongful payment by the trustee to the general contractor before the claims of subcontractors and laborers were paid was not sufficient to show a violation of the statute where it failed to allege the filing of such claims prior to the time of full payment; it being presumed that the trustee performed his statutory duties and that no claims had been filed.



# New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations

## BLAWFORMS FOR CONCRETE CURBS

Forms for deep concrete curbs are made by building up two tiers of single forms with their adjacent flanges bolted together and the successive sections connected by slip joints, thus providing for any required height and length.

The form plates are held in position by vertical steel stakes driven through lugs to penetration in the ground. If the curb is very high, and particularly if it is battered on one face, it is necessary to supplement the stakes by the use of temporary collapsible dividing

collapsible dividing plate which can be removed without removing either of the side form plates.

The curbs at the corners of street intersections can be most advantageously made with Blaw Flexible Forms that are fabricated from single pieces of special steel and will always spring back to the flat position when released. They are held securely in position by stakes not more than 18 inches apart and by dividing plates with slotted shoulders at the top as shown in the illustration, that hold them securely in position.

Where a constant repetition of the same radius occurs, Blaw Radius Forms are recommended. These have a channel shape cross-section made with thin steel web and light curved flange angles riveted to the outside faces, making them resemble somewhat the light fascia girders for structural steel work. These are very accurate and rigid and are easily handled. They are used like the flexible forms excepting that the stakes pass through holes drilled in the top and bottom flange angles and therefore do not require special lugs to receive them. Radius forms

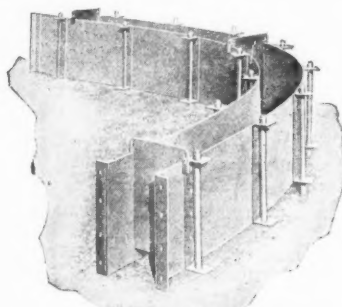


UNIVERSAL FORM FOR 18-INCH BATTERED CURB

plates which are set transversely to the side plates and space the latter exactly until the concrete is filled in between them, after which they are easily removed.

The dividing plates, 3/16 inch thick, have shoulders at the upper ends that engage slots in the form plates, locking them in position. They do not project above the top flanges of the forms, thus avoiding interference with any apparatus that may use the forms for track rails.

The dividing plates are of the required thickness to provide clearance at expansion joints where they are not removed until after the concrete has received its initial set. For positions intermediate between expansion joints, they may be removed before the concrete is set, permitting the concrete to fill the space occupied by the plates and make a monolithic structure without jointing there. For battered curbs, there has been developed a



FLEXIBLE FORM FOR CURB CORNER.

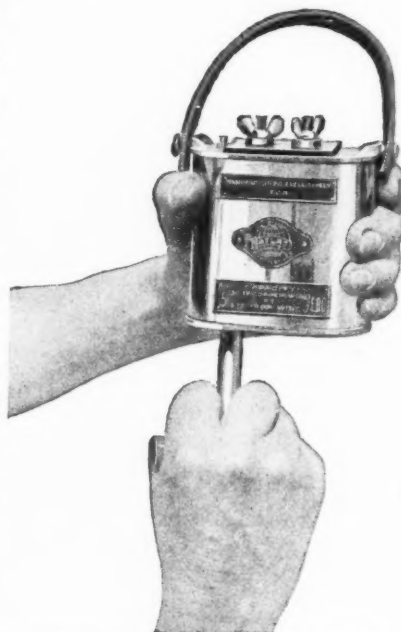
are made in standard lengths of 28 inches to 189 inches with corresponding radii of 18 inches to 120 inches.

## DAVIS NO. 1 BLASTER

The Davis No. 1 Blaster made by the Atlas Powder Company is a small 3 1/4-pound machine that develops ample current to fire five 35-foot copper wire electric blasting caps connected in single series.

The machine is encased in a nickel

plated seamless brass tube with aluminum top and bottom plates and a leather strap for carrying. The leader wires being attached to the binding posts, the machine is held in the left hand and the key, held in the right hand, is inserted in the



USING DAVIS No. 1 BLASTER

slot in the bottom and quickly twisted as far as possible to the right, thus firing the charge from a safe distance and with certainty and rapidity.

## SHAPE AND BAR BENDING MACHINE

The Wallace Supplies Manufacturing Co. has put on the market the Wallace No. 5-A Angle Bender, for bending angles, channels, tees, rounds, square, square twisted, special sections and flat bars on edge, which weighs 1200 pounds. Angles can be bent with the web of angle on either the inside or the outside of the circle. A U-shape clamping plate holds angles to follower bar and prevents distortion of the angle iron. This clamp can be quickly applied and removed without loss of time.

A follower bar operates between the rollers and the material and is machined to suit the section of the material.

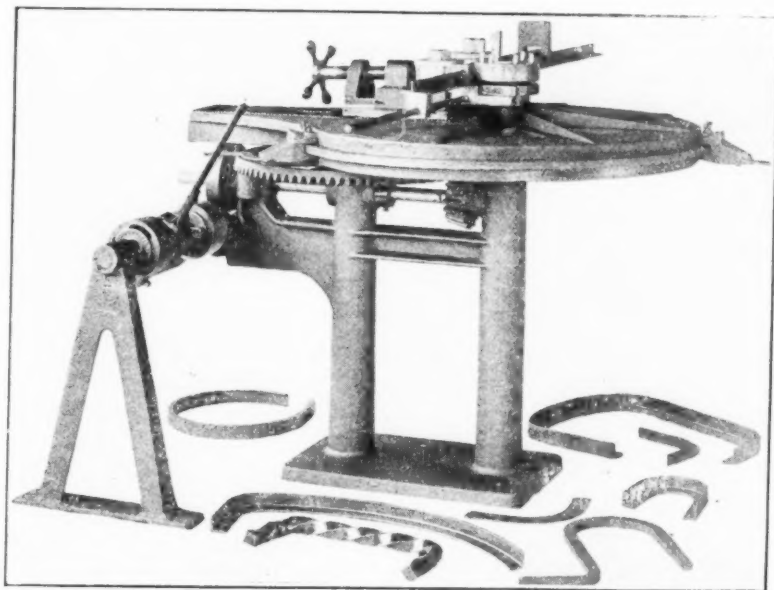
The roller bracket for follower bar is adjustable to and from the center with a range to admit of the use of forms as large as 50 inches diameter. Machines with even greater adjust-

ment can be furnished when required.

The machine is operated by a lever engaging the friction clutch pulley for forward and reverse and is equipped with adjustable stops to automatically disengage the clutch when the bend is completed; also, to disengage clutch from reverse when rollers have returned to the starting position. The stops are adjustable to cut and degree of angle required.

The heads or forms are not standard, but are made to order on receipt of specifications. The illustration shows machine equipped with dies suitable for bending angle iron, with the web of angle which is in the horizontal plane to be bent to the inside of the circle.

Samples of work bent up include channel  $1\frac{1}{2} \times \frac{3}{4} \times \frac{1}{2}$ -inch, bent cold, legs in, to 18 inch diameter, 320 degrees. Angle,  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$ -inch, bent cold, leg in,  $3\frac{1}{2}$ -inch radius, 90 degrees and 20-inch radius 45 degrees. Square twisted steel reinforcement bar,  $1\frac{1}{2}$ -inch diameter, bent cold, 2-inch radius, 90 degrees. Flat steel,  $1\frac{1}{2} \times \frac{3}{4}$ -inch bent cold on edge, 1-inch radius to 90 degrees and 8-inch centres, 180 degrees. Flat steel,  $2 \times \frac{3}{4}$ -inch, bent cold on edge, 3-inch radius, 90 degrees. Angle,  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$ -inch, bent cold, leg in,  $7\frac{1}{2}$ -inch o. d., 180 degrees. Tee, mild steel,  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$ -inch, bent cold, leg out, 3-inch radius, 90 degrees. Angle,  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$ -inch bent cold, leg in,  $3\frac{1}{2}$ -inch radius, 90 degrees and 20-inch radius 15 degrees.



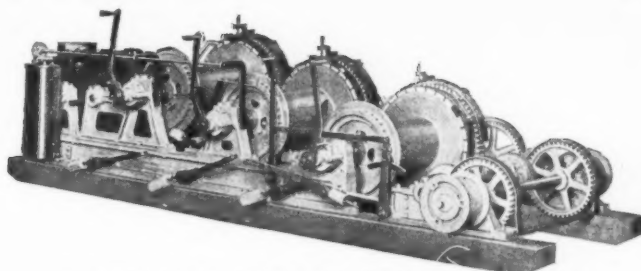
MACHINE WITH SAMPLES OF SHAPES AND BARS BENT BY IT.

#### LIDGERWOOD EQUIPMENT

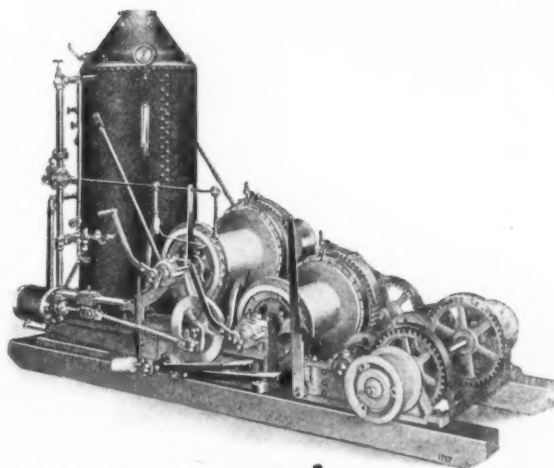
A very complete catalogue has just been issued by the Lidgerwood Mfg. Co., covering complete derricks of all types, derrick fittings for various types of wood derricks, and the various types of hoists, both steam, electric and oil engine driven, from the single-drum type of operating the derricks with booms of fixed radius, to the three-drum hoists with boom swinging gears for operating two-line grab buckets on derricks having a variable radius boom, and bull wheel for revolving.

Different types of lever arrangements are shown, both with the lever racks on the same bed with the hoists, and also showing the different methods of lever attachment for controlling the operation of the engine and derrick from a lever rack placed at a convenient point away from the hoist.

There is also a complete line both of hand power derricks and hand power hoists for same. A questionnaire is given covering all the information that is required to give complete specifications and estimates on



ELECTRIC HOIST FOR OPERATING GRAB BUCKET



STEAM DERRICK HOIST, WITH DRUMS FOR SWINGING BULL WHEEL

any type of derrick and hoist that may be required.

The illustrations show two types of hoists which are standard for derrick work. The steam hoist is fitted to perform all the operations of ordinary derrick work, one drum being used for hoisting the load, the second drum for topping the boom, and the swinging drums rotate the bull wheel, swinging the derrick. All three operations can be performed simultaneously.

The electric hoist shown has, in addition, a third drum. This type of hoist is used for operating a two-line grab bucket, two drums operating the bucket, and the third raising and lowering the boom. Both these types are built with steam, electric or gas engine motive power.

#### INDUSTRIAL NOTES

##### ROAD MACHINERY BUILDING COMPANY ENLARGED

The Good Roads Company of Kansas City, Mo., manufacturers of high pressure atomizing road oilers, tar and asphalt spreaders, sprinklers, power flushers and other road building and maintenance machinery, was recently sold to the Good Roads Corporation, a new organization which will continue to manufacture the old line as well as other types of road machinery.

All of the active members of the new corporation have had many years of experience in the manufacture and sale of such equipment. Plans are now under way to enlarge the plants so that the production can be at least tripled. Ever since the new corpora-

tion took over the business their two experienced engineers have been studying the equipment manufactured and have made some minor improvements.

The Good Roads Corporation is now in position to make immediate delivery of their combination high pressure atomizing road oiler, tar and asphalt spreaders and their high pressure road oilers.

#### AN \$80,000,000 RAILROAD ORGANIZED IN CHILI

It is reported that in Santiago de Chile a corporation is being formed with a capital of \$80,000,000 for the purpose of constructing a railway from Copiapo, already connected by railway with the Chilean port of Caldera, to Buenos Aires. It has also been announced that the Argentine Government has conceded to this concern ample facilities for making the necessary surveys and that the concession is at present under consideration. This railway will give a direct outlet to the Pacific for the agricultural and live stock products of the Northern provinces of Argentina.

#### NEW YORK ADMITS LIME TO CONCRETE

The Board of Standards and Appeals of New York City on April 19 adopted the following ruling:

"The use of hydrated lime in all classes of concrete construction shall not be prohibited when used in accordance with the condition hereinafter set forth.

"The hydrated lime shall conform with the following table, all weights given being the amount of lime which may be incorporated for each 95-pound bag of portland cement used:

"1-1½-3 mix: 4 pounds of hydrated lime per bag of cement.

"1-2-4 mix: 5 pounds of hydrated lime per bag of cement.

"1-1½-5 mix: 6 pounds of hydrated lime per bag of cement.

"For hand mixed concrete, the hydrated lime and portland cement shall be well mixed while dry.

"Hydrated lime shall not be used in concrete which is to be deposited under water."

#### UNUSUAL STEAM SHOVEL WORK

A seven-day test recently made on the operation of a 300-ton Bucyrus steam shovel, installed on the Queenstown-Chippewa power canal by the Hydro-Electric Power Commission of Canada, shows that in the seven days and two nights there were handled by it a total amount of 24,406½ yards of earth and rock at an expenditure of 0.826 k.w.h. of electricity per yard.

The shovel, which is said to be one of the largest in the world, has a 90-foot boom and an 8-yard bucket working on a 50-second cycle. It is operated by two 250 h. p. electric motors

for the hoist, one 150 h. p. motor for thrust, and one 150 h. p. motor for swing, all of the Westinghouse 440-volt, 3-phase 25-cycle type.

The machine is operated by two men and at the time of the test was working 90 feet below the surface and loading material on cars 70 feet above its base.

In the operation of the shovel, the regenerated braking is utilized when the bucket is lowered 70 feet after delivering its contents to the cars. During the lowering of the bucket, the motors are connected to the power supply and operate as induction generators. Although this develops some energy, the principal advantage is in saving wear and tear on the brakes.

### PERSONALS

Gregory, John H., has been appointed consulting engineer to the Bureau of Water Works Extension of Columbus, Ohio, which has been authorized to carry out improvements recommended by Mr. Gregory in a report submitted to the city last year. C. P. Hoover, who has been in the employ of this city for the past sixteen years, for the last ten in the Water Works Department, has been appointed engineer in charge.

Morden, E. B., has been appointed chief of the Bureau of Street Cleaning, Philadelphia.

Finebaum, H. J., formerly engineer, Shipyard Plants Division of the Emergency Fleet Corporation, Philadelphia, has accepted the position of assistant engineer to C. W. Hudson, consulting engineer, New York City.

Wilson, Clarence, has been appointed water superintendent of Montpelier, Idaho.

Verharen, A. W., has been appointed city engineer of Helena, Mont.

Pollock, James R., has been engaged by the city engineer's office, Flint, Mich., to investigate sewage disposal.

Olson, W. S., has been appointed office engineer of the commission of drainage and waters of Minnesota.

Guise, Philip, has been elected secretary of the Engineering Board for pier development, Jersey City.

Duck, J. A., is making a special drainage survey of the streets of Illinois.

Green, W. H., has been appointed project manager of the U. S. Reclamation Project at Huntley, Mont.

Wallace, Frank, has been appointed resident engineer of the U. S. Bureau of Public Roads at Missoula, Mont.

Patterson, J. R., has been appointed senior highway engineer, U. S. Bureau of Public Works, at Missoula, Mont.

Boustow, G. F., has been appointed location engineer of St. Louis County, Minnesota.

Meacham, J. C., has been appointed engineer of road construction, Marshall County, West Virginia.

Boutelle, G. J., has been elected city engineer of Chester, Pa.

Whipple, S. C., has been made assistant state engineer of California, with headquarters at Sacramento.

Baker, H. S., has been appointed county engineer of Spokane County, Washington.

Sanders, C. L. B., has been elected city engineer of Gainesville, Ga.

Robinson, D. O., superintendent of construction of the Hetch-Hetchy project in California, was recently killed by an accident on the work. He had been superintendent of construction of the Lower Otay Dam at San Diego, Cal.

Ackerman, J. W., has been appointed superintendent of the Water, Light & Power Department of Watertown, New York.

Kelsey, L. D., has been appointed city engineer of Raymond, Oregon.

Martin, Joseph A., has been appointed commissioner of public works for Detroit.

Richmond, W. S., has been appointed principal assistant engineer on the St. Lawrence River surveys.

Knittle, F. S., has been appointed city engineer of Casper, Wyoming.

Burkland, A. O., has been appointed engineer in charge of field surveys in Hawaii.

Fertig, J. H., has been appointed project engineer of the Grants Pass Irrigation District, Grants Pass, Oregon.

Pratt, A. H., has been appointed deputy engineer for the North Jersey District Water Supply Commission.

Prentice, Eugene, has been appointed special assistant city engineer, Binghamton, New York.

Holbrook, A. R., has been appointed extension, Columbus, Ohio.

Donnelly, C. E., has been appointed assistant city engineer, Kansas City, Mo.

Teeter, L. C., has been appointed engineer of Riley County, Kansas.

Hillman, Homer, has been appointed engineer of Sherman County, Kans.

Montgomery, Julian, has been appointed city engineer of Wichita Falls, Texas.

Brodie, J. A., has been elected president of the Institution of civil engineers, England. He has also recently been appointed consulting engineer to the government of India for planning of the new capitol at Delhi. He is also city engineer of Liverpool, England, with a staff of 4,000 men in charge of more than 500 miles of highways and streets and about 500 miles of sewers.

Dollard, E. C., has been appointed city engineer of Jamestown, N. Y.

Potter, J. G. B., has been appointed superintendent of public works at Jamestown, New York.



# PUBLIC WORKS.

CITY

COUNTY

STATE

A Combination of "MUNICIPAL JOURNAL AND PUBLIC WORKS" and "CONTRACTING"

A. PRESCOTT FOLWELL, *Editor.*FRANK W. SKINNER, *Associate Editor*

## Contributed Articles and Reports

Contributions suitable for this paper, either in the form of special articles or as letters discussing public works matters, are invited and paid for. City, County and state officials are particularly requested to send to Public Works regularly their annual and special reports.

## Information Bureau

The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

NEW YORK, JUNE 26, 1920

## CONTENTS

MEASURING INTERNAL PRESSURE IN HYDRAULIC-FILL CORES.—Illustrated .....	Page 553	Boston's High-Pressure Water System.....	Page 565
Illinois Highway Situation.....	Page 555	Dublin's Concrete Quay.....	Page 565
Michigan Roads Injured by Traffic.....	Page 555	Jamaica Bay Terminal.....	Page 565
To Investigate Cincinnati-Hamilton Highway....	Page 556	National Park-to-Park Highway.....	Page 565
New Jersey's State Highway Engineer.....	Page 556	Necessary Legislation.....	Page 565
Protest Against Suspending Highway Construction.	Page 556	Federal Water Power Bill.....	Page 565
SANTA BARBARA'S GIBRALTER DAM.—Illustrated	Page 556	ELECTRIC PUMPING IN CONCORD.....	Page 566
REPAINTING AN OLD STEEL BRIDGE.....	Page 558	The Bayonne Submerged Water Main.....	Page 567
BATTLE CREEK WATER WORKS.....	Page 559	Predecessors of Chicago's New Bascule.....	Page 567
Pennsylvania Road Contract.....	Page 560	CUMBERLAND VALLEY RAILROAD BRIDGE.—	
Opposes Federal Highway Commission.....	Page 560	Illustrated .....	Page 568
Alternate Plans Permitted by Specifications....	Page 560	Revised Freight Rates for Construction Materials	Page 568
AVOIDING FALSEWORK IN BRIDGE REPAIRS.—		EDITORIAL NOTES .....	Page 569
Illustrated .....	Page 560	Highway Work Postponed. Inefficient Transportation.	
PUBLIC COMFORT STATIONS IN WISCONSIN.—		Labor Scarcity. Protect the Strike Breakers.	
Illustrated .....	Page 561	To Increase Construction Transportation Facilities	Page 570
Classification and Compensation Proposed by Engineering Council.....	Page 562	Beverly R. Value.....	Page 570
Federal Public Works Department Referendum	Page 562	Sound Labor Union Advice.....	Page 570
OPERATING A MECHANICAL FILTRATION PLANT .....	Page 563	Mechanical Equipment for Highway Construction	Page 571
Chicago's Street Railway Trailers.....	Page 565	City Planning Literature.....	Page 573
		Concrete Block Vehicular Tunnel Investigated	Page 574
		Whitfield P. Pressinger.....	Page 574
		Recent Legal Decisions.....	Page 575

Published Weekly at FLORAL PARK, N. Y., by MUNICIPAL JOURNAL & ENGINEER, INC.,  
Executive and Editorial Offices, 243 West 39th Street, New York.  
S. W. HUME, Pres.; H. F. POMEROY, Vice-Pres.; J. T. MORRIS, Treas.; A. PRESCOTT FOLWELL, Secretary.  
Entered as second class matter January 3, 1906, at the Post Office at New York, N. Y.,  
under the Act of Congress of March 3, 1879.

## THE AUSTIN-WESTERN ROAD MACHINERY CO.

# On the Job In Town or Country

Contractors and Road Officials—both County and Municipal—have found that Austin Rollers are the safe, dependable rollers for every job.

There are three types: the Austin Motor Roller; the Austin Tandem Roller and the Steam Roller.

Each is peculiarly fitted to certain tasks. And each is the leader of its line.

### Austin Steam Macadam Roller

Truly the leader of its line—it is the modern steam roller.

Ample boiler—extra large heating surface and steam space—cylinders mounted on base independently of the boiler.



For country work—paving or repairing, there is no machine to equal this Austin Motor Roller. Single and double cylinder types in sizes from 7 to 15 tons.



## THE AUSTIN-WESTERN ROAD MACHINERY CO.

### MAKERS OF

MOTOR ROLLERS	STONE SCREENS	STONE SPREADERS	DUMP WAGONS	ROAD PLOWS
STEAM ROLLERS	STONE ELEVATORS	ROAD OILERS	STREET SPRINKLERS	WHEELED SCRAPERS
SCARIFIERS	PORTABLE BINS	ROAD GRADERS	STREET SWEEPERS	DRAG SCRAPERS
ROCK CRUSHERS	QUARRY CARS	ELEVATING GRADERS	MOTOR SWEEPERS	



# THE AUSTIN-WESTERN ROAD MACHINERY CO.

## With Austin Rollers On Every Sort of Work

### The Motor Macadam Roller

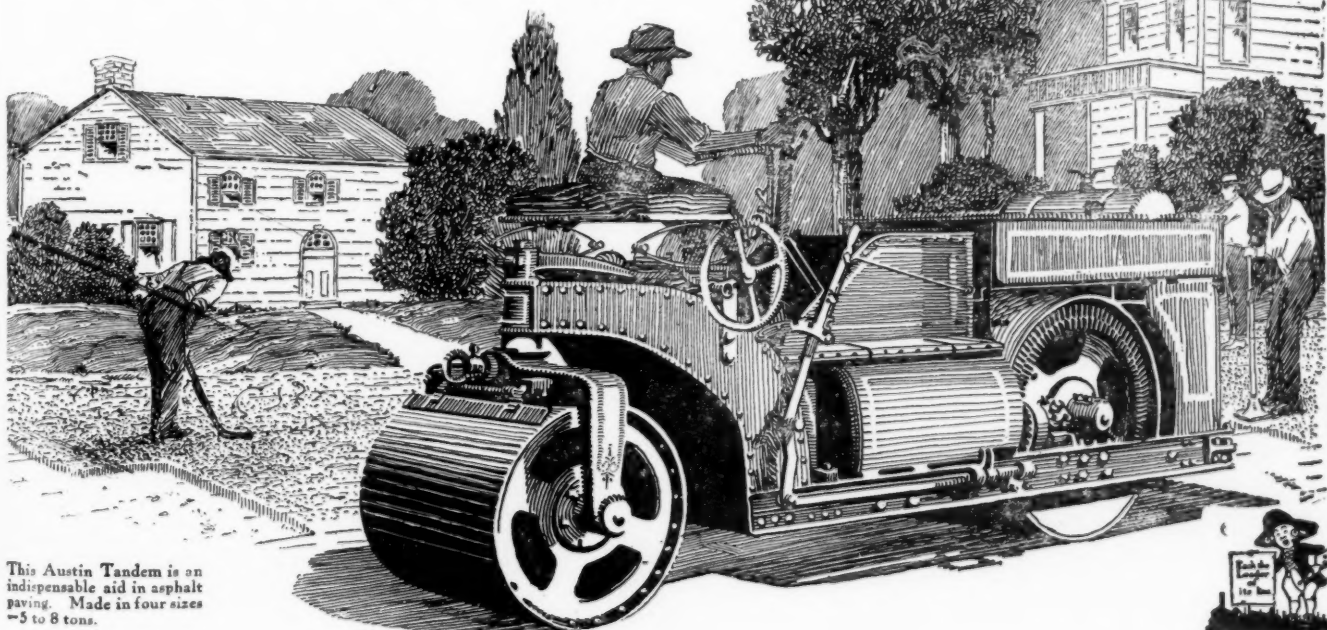
Made in five sizes—7 to 15 tons. Two speeds—steel gears—practical self-starting device—simple ignition; no coils or batteries; uses kerosene or gasoline.

### The Austin Tandem Roller

Take asphalt work. Here there is no equal of the Austin Tandem Roller. It is a steady running, dependable machine. Double cylinder motor, economical in gasoline consumption. Easily controlled—power steer. Low center of gravity, yet high road clearance. These are only a few of the reasons why you should send for

#### "Roller Facts and Performances"

given in our catalogs and circulars. ¶ Scarifier Attachment for use with Austin Steam or Motor Rollers—10 tons or larger sizes. The "he-man" of scarifiers—a powerful pressure scarifier operated by the roller man. Easily and instantaneously lifted out of the way when the roller alone is wanted.



This Austin Tandem is an indispensable aid in asphalt paving. Made in four sizes—5 to 8 tons.

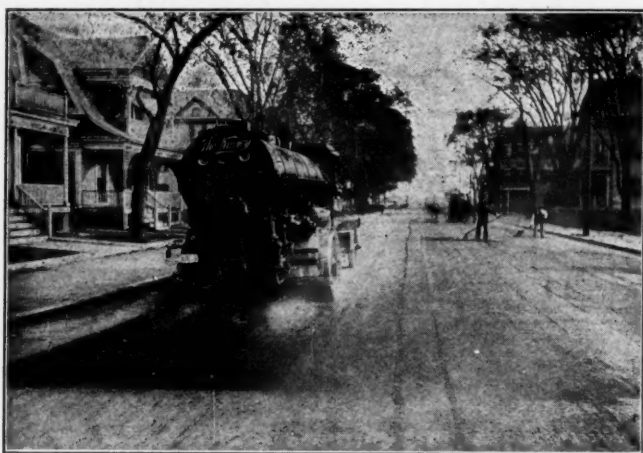


# THE AUSTIN-WESTERN ROAD MACHINERY CO.

## CHICAGO

NEW YORK	BOSTON	RICHMOND	COLUMBUS	NEW ORLEANS
ALBANY	PHILADELPHIA	CHARLESTON, W. VA.	LOUISVILLE	JACKSON, MISS.
DALLAS	ST. PAUL	NASHVILLE	PITTSBURG	PORTLAND, ORE.
OKLAHOMA CITY	MEMPHIS	ATLANTA	LOS ANGELES	SAN FRANCISCO





KINNEY Patent Combination Auto Heater and Distributor used by the City of Providence, R. I.

**T**HE construction of smooth, durable roads requires up-to-date machinery designed and built especially for the work.

The KINNEY Patent Combination Auto Heater and Distributor is the most efficient, economical equipment for building and maintaining bituminous highways.

The KINNEY Auto Distributor comprises, in addition to the tank mounted on a specially-designed

motor truck chassis, the KINNEY heating and circulating system, KINNEY pressure pump, spraying nozzles, valves and control levers. This entire road oiling outfit may be removed from the chassis in less than half an hour, leaving the truck free to do other work.

Road Builders, Contractors, Municipalities and many others are saving time, labor and money by using KINNEY equipment.

## **Patent Combination Auto Heater and Distributor**

*QUALITY*  
**Kinney**  
*EFFICIENCY*

### **KINNEY MANUFACTURING COMPANY**

New York

Philadelphia

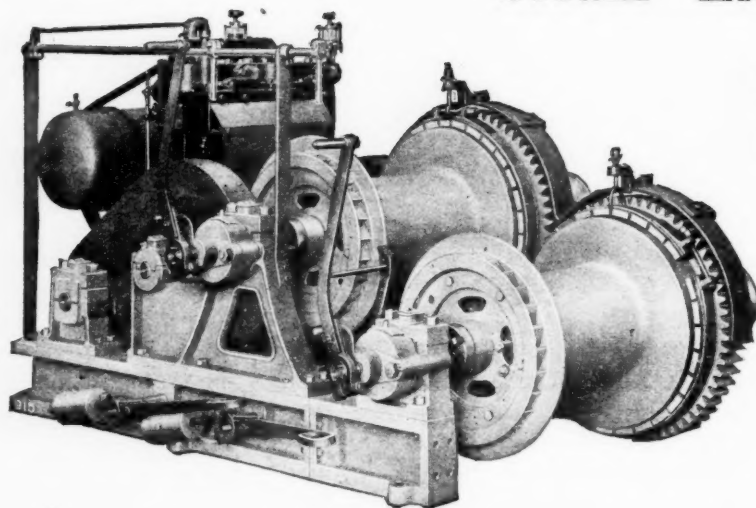
Kansas City

San Francisco

Chicago

# **LIDGERWOOD HOISTS**

**Steam—Electric—Gasoline**



## **For Every Type of Contracting Work**

Lidgerwood Gasolene Hoists are of the same quality and strength as their standard steam and electric hoists.

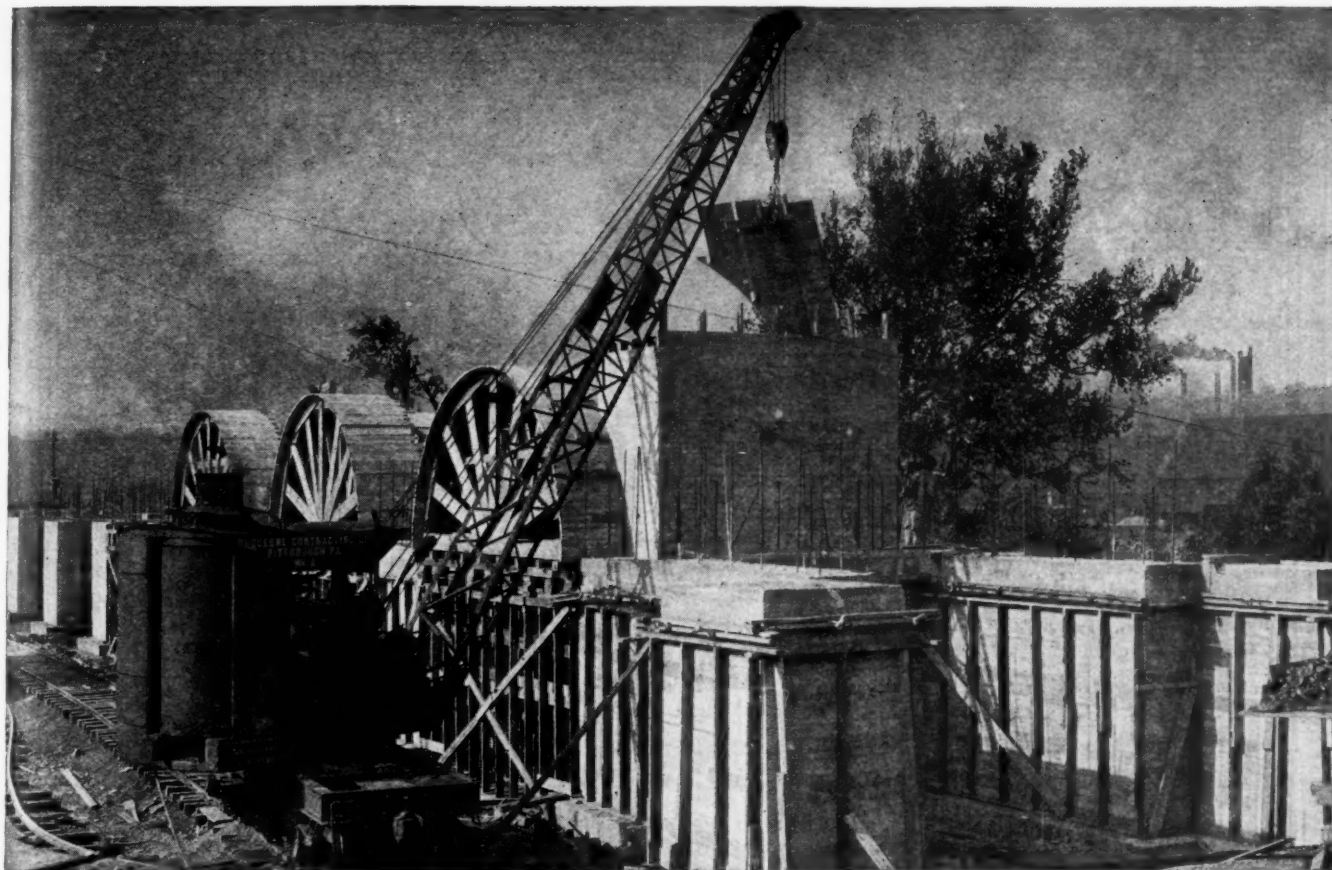
They are hoists, Self contained on a strong base, not a collection of drums and gears driven by a gas motor.

They have power and strength to withstand the severe usage of contracting work.

CATALOGS COVERING ALL TYPES OF HOISTS

**LIDGERWOOD MFG. CO.** 96 LIBERTY ST.  
NEW YORK

Philadelphia, Pittsburgh, Chicago, Detroit, Seattle, Los Angeles, Cleveland,  
Charleston, W. Va., London, England



## Contracts Completed on Time

### BROWNHOIST

#### Products Include:

Locomotive Cranes  
Grab Buckets  
Drag-Line Buckets  
Electric Hoists  
Tramrails & Trolleys  
Overhead Tr. Cranes  
Pillar & Gib Cranes  
Heavy Dock Machinery  
Suspended Concrete Bins

Write for Catalogs

ARE you losing jobs today because you cannot get delivery of material on time and at a reasonable price? And having the material do you find it almost impossible to get laborers who will stay with you and help finish the contracts on time?

Many contractors find a Brownhoist solves these problems for them. By maintaining a storage yard for materials you can buy to advantage when the market is right. And a lot of material is on hand and ready for you when you are ready for the job. It enables the contractor with a Brownhoist to figure closer on a job because he has the material and knows what it cost him.

Then the Brownhoist is put on the job. It handles forms and reinforcements, drives piles, and does all the bucket work such as handling stone, sand and gravel. In short it does most of the work you now have to rely on the laborer to do. And it does it better, faster and cheaper. If you are interested in the contractor's problems, write for Catalog K. It will interest you to see in what way many contractors are handling their work.

## The Brown Hoisting Machinery Company

40 Years in Crane Business

Engineers and Manufacturers of Heavy Dock Machinery,  
Bridge Cranes, etc., as well as Smaller Cranes and Hoists.

Cleveland, Ohio, U. S. A.

Branch Offices in New York, Pittsburgh, Chicago and San Francisco.  
European Rep., H. E. Hayes, 12 Rue de Phalsbourg, Paris.

# AMERICAN BRIDGE COMPANY

HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

*Manufacturers of Steel Structures of all classes  
particularly BRIDGES AND BUILDINGS*

## Sales Offices

NEW YORK, N. Y.	30 Church Street	St. Louis, Mo.	Third National Bank Building
Philadelphia, Pa.	Widener Building	Denver, Colo.	First National Bank Building
Boston, Mass.	John Hancock Building	Salt Lake City, Utah	Walker Bank Building
Baltimore, Md.	Continental Trust Building	Duluth, Minn.	Wolvin Building
PITTSBURGH, PA.	Frick Building	Minneapolis, Minn.	7th Ave. & 2nd St., S. E.
Buffalo, N. Y.	Marine National Bank		
Cincinnati, Ohio	Union Trust Building		
Atlanta, Ga.	Candler Building		
Cleveland, Ohio	Guardian Building		
Detroit, Mich.	Beecher Ave. & M. C. R. R.		
CHICAGO, ILL.	208 South La Salle Street		

## Pacific Coast Representative:

U. S. Steel Products Co., Pacific Coast Dept.	
San Francisco, Cal.	Rialto Building
Portland, Ore.	Selling Building
Seattle, Wash.	4th Ave. So., Cor. Conn. St.

Export Representative: United States Steel Products Co., 30 Church St., N. Y.

*"Our transportation bill can be reduced  
considerably, if we oil the highways."*

# INDIAN ROAD OIL

**The pioneer among road oils**

## INDIAN REFINING COMPANY

244 MADISON AVENUE

NEW YORK



**HOWE ST  
NORTH AVE**

*DURABLE  
THROUGH  
STORM and  
SUNSHINE*

**"ING-RICH"**  
PORCELAIN ENAMELED IRON  
**SIGNS**

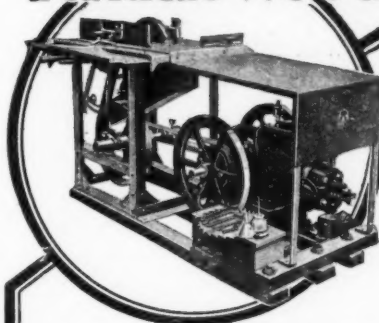
never fade and are practically indestructible. The porcelain and iron of which they are made are fused into one enduring substance by a special process. They are guaranteed for ten years but will remain brilliant and serviceable for a much longer period.

Hundreds of municipalities are using "Ing-Rich" Signs. We'll gladly tell you why. No obligation incurred.

Ingram-Richardson  
Manufacturing Company  
Beaver Falls, Pa.



## FAIRBANKS-MORSE Portable Wood Worker



With attachments for molding mortising, rabbeting, jointing, matching, boring, sand papering, tool grinding, sawing irregular shapes and tongue and groove work.

### Here's Your Wood Worker

It will pay for itself over and over again by saving time, utilizing waste lumber and in dozens of other ways. Has the famous Fairbanks-Morse "Z" Engine with Bosch Magneto and runs on kerosene. Send for Bulletin D-7054.



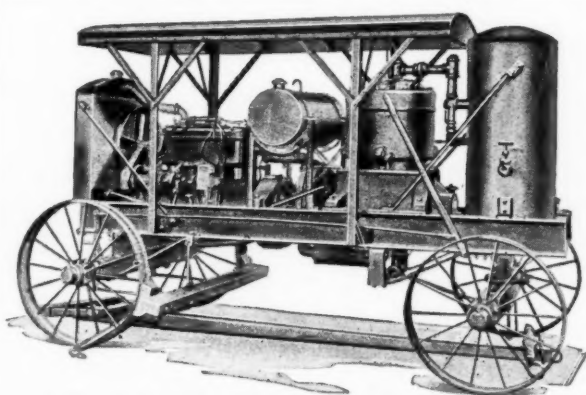
CONTRACTOR'S EQUIPMENT DEPT.

**FAIRBANKS, MORSE & CO.**  
30 CHURCH ST. - NEW YORK CITY

BALTIMORE OFFICE  
115 East Lombard St.

BOSTON OFFICE  
245 State Street

## A Portable Air Supply



FOR ROCK DRILLING IN ROAD WORK  
FOR CUTTING PIPE TRENCHES IN ROCK  
FOR REMOVING BRICK OR CONCRETE  
FOR CALKING GAS OR WATER MAINS  
FOR RIVETING ON BRIDGES OR BUILDINGS A

**Sullivan "WK-31" Compressor**

will provide an independent, reliable, cheap air power supply. Vertical, two-cylinder compressor gas-engine driven. 150 cubic feet capacity. 28 H. P. Weighs 4,300 lbs. Bulletin 337-T.

**Sullivan Machinery Co.**  
122 So. Michigan Avenue, Chicago



# "PIONEER"

Where there is an asphalt use; there is a "PIONEER" product.

### OUR POLICY

"A personal interest in every order,  
An earnest endeavor to please."

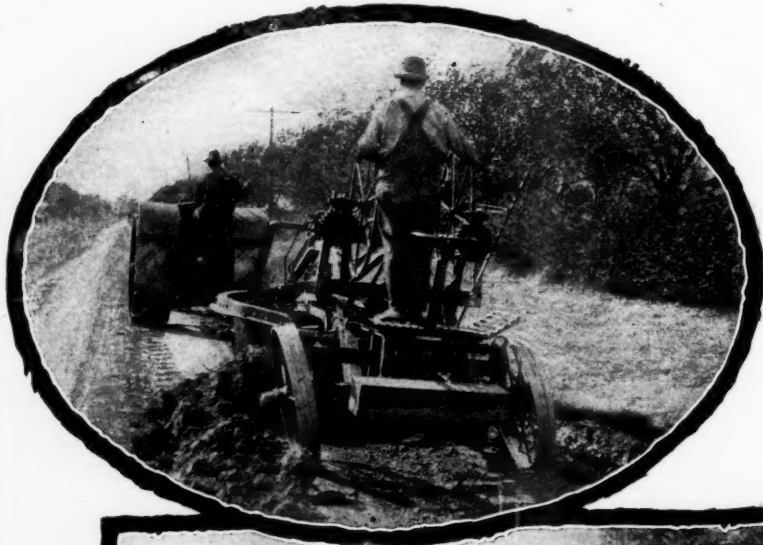
# "PIONEER"

Used for repairing the cracks in your concrete road and pavement, also other types. Acts like a liquid rubber and wears better.

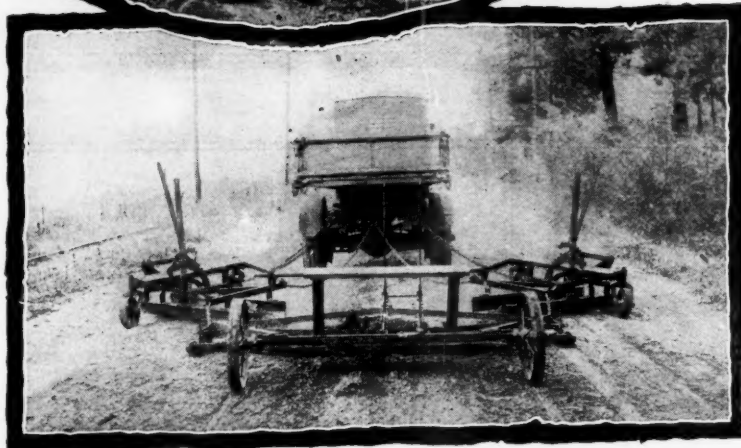
**THE PIONEER ASPHALT CO.**  
LAWRENCEVILLE, ILL.

## Maintain Your Roads and Streets—NOW

No city, township, county, or state can afford to neglect its streets or roads. Neither can it afford to employ inefficient machines or methods. Adams Road Building and Maintenance Machinery has the reputation of producing more miles of good roads or streets per dollar than any other machines or methods.



Adams Adjustable Leaning Wheel Graders do more work with less power, and therefore less cost than any others. The difference is in the Adjustable Leaning Wheels which eliminate the power wasting side-slipping common to other graders. There's a size to suit your work.



Adams Road Maintainer shapes roads and streets, both sides and center, in one trip and leaves the surface smooth and perfectly crowned. It will shape from 20 to 25 miles of road in a single day.



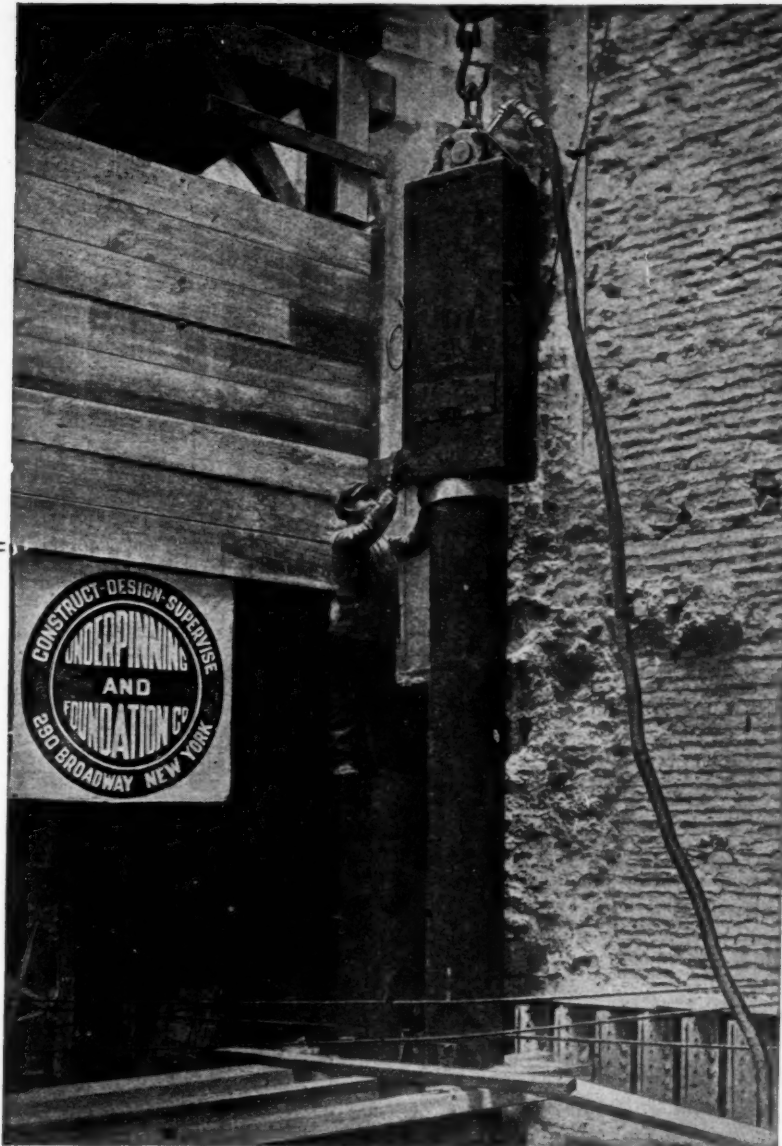
Adams Road Patrol Scraper, a one-man, two-horse scraper, is particularly adaptable to towns and districts where the patrol system of road maintenance is used. It cuts off the high places, fills up the low places, and smooths up the road or street generally, at a very low cost per mile.

The Adams Line Also Includes  
Road Drags, Scarifiers, Plows, Scrapers, Etc.

Write for complete catalog—today.

### J. D. ADAMS & COMPANY

Home Office and Factory, Indianapolis, Ind., U. S. A.



A difficult foundation job at William Street and Maiden Lane, New York City.  
Hercules Steel Piles used

**T**HESE piles were driven to refusal within one inch of, and thirty feet below, an adjoining twelve story building on spread footing. No settlement occurred. The job was completed in four days.

On all foundation work the use of Hercules Steel Piles eliminates caissons and cantilevers. There is no foundation work requiring caissons that cannot be put down with Hercules Steel Piles—a saving of much time and money.

We are specialists in difficult foundation work. Consult with us when confronted with a serious problem.

**Underpinning & Foundation Company**

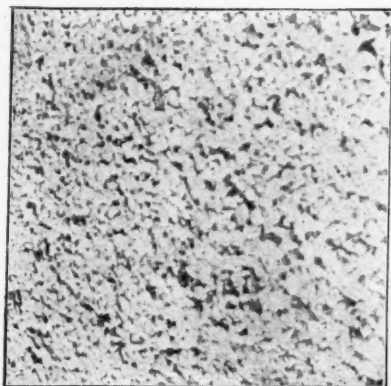
290 Broadway

New York City



# TEXACO

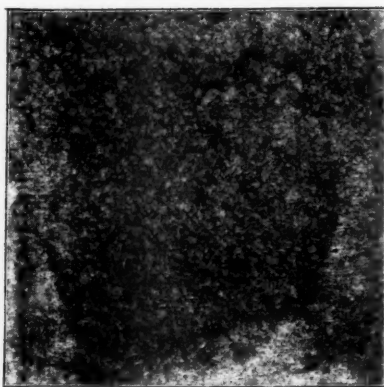
## ASPHALT MACADAM



### LOAD

#### THE FOUNDATION

may be of Telford, broken stone or gravel. It should be compact and solid. The chief function of the foundation is to distribute the load of traffic.



### WEAR

Wearing Surface with first coat of TEXACO Asphaltic Cement and broken stone.



Wearing Surface with final seal coat of TEXACO Asphaltic Cement.

### THE WEARING SURFACE

of an asphalt macadam road is composed of different sizes of broken stone and Asphaltic Cement. The steps in the construction are as follows:

- (a) Spread and roll to proper thickness stone of from 1 to  $2\frac{3}{4}$  inches in size.
- (b) Apply TEXACO Asphaltic Cement by either hand pouring or pressure distributor method, using from 2 to  $2\frac{3}{4}$  gallons per square yard.
- (c) Spread screenings of  $\frac{3}{4}$  inch stone to dust.
- (d) Apply final seal coat of TEXACO Asphaltic Cement, using  $\frac{1}{4}$  to  $\frac{1}{2}$  gallon per square yard.
- (e) Spread screenings of  $\frac{3}{4}$  inch stone to dust and roll.



## The Texas Company

ASPHALT SALES DEPARTMENT

17 Battery Place New York City

New York  
Philadelphia  
Richmond  
Boston

Jacksonville  
Tampa  
New Orleans  
Memphis

Chicago  
Cleveland  
Oklahoma City  
Kansas City

Houston  
Des Moines  
Minneapolis  
Wichita



# Advance Contract News

## BIDS ASKED FOR ADVANCE INFORMATION

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

## BIDS ASKED FOR

### STREETS AND ROADS

#### Ct., Wallingford. 8 p.m., June 29

Bids for the furnishing of all labor, materials, tools, machinery, teams or auto trucks for the complete construction of about 12,800 sq. yd. concr. pavement, bit. bound macadam or concr. base with asphalt top. (The Connecticut Co.'s part on No. Main St. is about 1,070 sq. yd.). Also 4,660 lin. ft. combined concr. curb and gutter and the resetting of about 2,300 lin. ft. stone curb. W. A. Mackenzie, civil engr.

#### Del., Wilmington. noon, July 6

For constr. of alternate types of standard pavement, on the Lincoln Hwy., beginning and connecting to the contract known as Section No. 4, Lincoln Hwy., near Pike's Creek and extending to Roseville bridge, a distance of 2.2 miles in Mill Creek hundred, and known as Section No. 5A of Lincoln Hwy. Chas. E. Grubb, comr., Room 122, Co. Bldg.

#### Ill., Springfield. 10 a.m., July 7

Constr. of roads in various counties.—Frank I. Bennett, dir. Dept. Pub. Works and Bldgs.

#### Ind., Marshall County. 1:30 p.m., July 3

Improv. of certain hwy. between Marshall and Kosciusko counties by grading, draining and paving the same with materials as set out in plans. Said roads to be improved is to be known and is located as follows: The Henry Craig et al Gravel Road between Etna and Bourbon twps. in Kosciusko and Marshall counties, respectively, when so improved.—Z. M. Tanner, aud.

#### Ind., Newton County. 1 p.m., July 5

Constr. of a macadam road, petitioned for by Henry Troup et al, in Washington twp., being Cause No. 2138.—S. R. Sizelove, aud.

#### Ind., Howard County. 11 a.m., July 6

Building various gravel roads in Howard County.—Wm. L. Benson, aud.

#### Ind., Petersburg. 2 p.m., July 6

Improv by grading and paving with stone of certain hwy. in Washington twp., Pike County. W. F. Risley, co. aud.

#### Ind., Greensfield. 10 a.m., July 6

Improv. of a certain hwy, 14,690 ft. in length by grading, draining and paving with gravel. Edward A. Cooper, aud. Hancock Co.

#### Ind., Frankfort. 2 p.m., July 7

Improv. hwy, 6,600.89 ft. by grading, draining and paving with brick. Edward Spray, aud., Clinton County.

#### Ind., Corydon. 2 p.m., July 6

Improv. 17,638 ft. by grading, draining and paving with stone; also the improv. of 12,859 ft. grading, draining and paving with stone in Harrison County. Sam C. Mauck, aud.

#### Ind., Auburn. July 7

Improv. of certain hwy. in Dekalb Co. by grading, draining and paving with gravel. Length of road 11 1-2 mi. Engineers estimate \$99,890. Board of Comrs. J. Frank McDowell, co. engr.

#### Mass., Concord. 2 p.m., July 2

Improv. of gravel road in Berlin Co. at estimated cost of \$15,000. Frederic E. Everett, state hwy. comr.

#### Mich., Lansing. 1 p.m., July 9

Improv. 1,284 miles of road in Burdell twp., Osceola County. Improvement will consist of shaping road, constr. necessary drainage structures and surfacing to width 16 ft. with gravel. Alternate proposals for surfacing with stone-gravel or slag-gravel.—Frank F. Rogers, state hwy. comr.

#### Mich., Lansing. 1 p.m., July 14

Bids for bit. surface treatment of 1,993 miles of road.—Frank F. Rogers, state hwy. comr.

#### Mich., Lansing. 1:30 p.m., July 2

Improv. 2,027 miles of road in Parma twp., Jackson County. Work to consist of shaping the sub-grade and placing one course gravel surface to width 18 ft.—Frank F. Rogers, state hwy. comr.

#### Minn., Salt Lake City. 10 a.m., July 6

Grading, installing water services and paving with 9-inch concr. Z. C. M. I. Av., between 2nd and 3rd West streets, in Paving Extension No. 172.—W. A. Leatham, city recorder, Bd. of Comrs.

#### Minn., Breckenridge. 3 p.m., July 7

For the constr. of Fed. Aid Proj. No. 161, Div. "A," state road No. 2, beginning at the southwest corner of Section 32, T. 134 N. R. 47 W., and ending at the southwest corner of Section 8, T. 135 N. R. 47 W.—P. E. Truax, co aud.

#### Miss., Lexington. 3 p.m., July 6

For improving pavement in the Town Square and Yazoo St.—John M. Harbert, Engr. Company, Indianola.

#### Mo., New Madrid. July 5

Improvement of the Malden-Risco Road, State Project, for grading, constructing culverts, and other incidental work on the state road 19.3 miles.—C. V. Hansen, hwy. engr.

#### N. J., Jersey City. 1 p.m., July 7

Reconstr that portion of the Hudson Blvd. between the southerly line of Fisher Av. and the westerly line of Bergenline Av. in towns of West New York, Guttenberg, and the twp. of North Bergen.—Bd. of Comrs., John P. McMahon, clk.

#### N. J., Union County. 8:30 p.m., June 29

Improv. north side of Westfield ave. with a reinf. concr. pavement and conc. or bluestone curbing, involv. 30,250 sq. yd. surface pavement; 8,845 lin. ft. curbing. J. Wallace Higgins, bor. engr. of Roselle.

#### N. Y., Auburn. noon, July 12

Paving Orchard Street from west line of James Street to east line of South Division Street, with approx. 12,000 sq. yd. either bitulithic, concrete or brick, and the laying of about 6,500 ft. cement curbing.—M. F. Dullea, city engr.

#### N. Y., Albany. 1 p.m., July 2

Reconstr and resurfacing of the following: Albany, Columbia, Dutchess, Fulton, Greene, Lewis, Oneida, Rensselaer, Ulster and Warren Counties. Irving V. A. Huie, secy., State Comr. of Hwys.

#### N. C., Asheville. noon, July 7

Constr. of approx. 3.58 mi. in Burke Co., also constr. of approx. 10x30 mi. of state hwy in Rutherford Co.—W. S. Fallis, state hwy. engr.

#### N. Dak., Cavalier. 1 p.m., July 6

Constr. of a state hwy. between Akr and Cavalier in Pembina Co. Contemplated work consists of 5.17 mi. of earth road improvement.—State Hwy. Comm., Bismarck.

## CONTRACTS AWARDED ITEMIZED PRICES

#### N. D., Bismarck. 10:30 a.m., July 9

Constr. of a state hwy. between Washburn and Wilton. Contemplated work consists of about 10 mi. of earth road improvement.—State Hwy. Comm.

#### Pa., Ebensburg. noon, July 2

Scaled bids for erection of 20,000 lin. ft. guard rails or barriers on the Haws Pike in Lower Yoder twp., said guard rails to be built of reinf. concr. posts and wire cable. H. Frank Dorr, co. eng., Trust Bldg.

#### R. I., Providence. noon, June 30

Reconstr. under provisions of the Fed. Aid Road Act of a section of state hwy. in towns of Coventry and West Greenwich, beginning at the vil. of Washington and extending southerly and westerly upon the Nooseneck Hill road, so-called, for a distance of 4.4 miles.—State Bd. of Pub. Wks.

#### S. C., Charleston. noon, July 5

Bids for 100,000 sq. yd. more or less, of Sheet Asphalt Pavement.—H. Dingle, city engr.

#### Texas, Canadian. 2 p.m., July 1

Improvement of certain hwy. in Hemphill County. Co. clk.

#### Toronto, Canada. noon, July 2

Bids for excavation, concrete structures and other necessary work on the Provincial Hwy. in twps. of Hope and Hamilton, between the towns of Port Hope and Cobourg.—W. A. McLean, deputy minister of hwy.

#### Wis., Madison. 10:30 a.m., July 7

Grading and paving the Lake to River Road in Iowa County, Wis.; Fed. Aid Proj. No. 140; clearing and grubbing, 0.72 acres; excav. earth, 45,944; rock, 18,024 cu. yds.; loose rock, 1,105 cu. yds.; borrow, 192 cu. yds.; concr., Class A, 455.93 cu. yds.; riprap, 2 cu. yds.; guard rail, 890 lin. ft.; concr. surfacing, 24 ft., 513.9 sq. yds.; concr. curb, 370 lin. ft.—Geo. C. Hank, 465 Sidney St

## SEWERAGE

#### N. J., Boonton. 8:30, July 6

Bids for furnishing and excavating for storm sewers together with erection and constr. of eight catch basins. Town clk.

#### Ontario, Canada. 6 p.m., June 29

Bids for approx. one-half mile of 8-in. sanitary sewer construction.—J. S. Allen, Esq., town clk.

## WATER SUPPLY

#### Mass., Boston. 2 p.m., June 29

Proposals for laying and relaying water pipes in Burt and Fuller Sts. and Thetford Ave., Dorchester.—Thomas F. Sullivan, comr. of pub. wks.

#### N. D., Bismarck. 8 p.m., July 12

Constr. of a complete water works system, including a filtration plant.—C. L. Burton, city aud., Builders' Exchange, Minneapolis, Minn.

#### Ohio, Springfield. July 1

Bids for furnishing 6-inch water pipes and fittings.—E. F. McKee, city mgr.



## BIDS ASKED FOR

## BRIDGES

## Ill., Springfield. 10:30 a.m., June 30

Constr. of two rein. concr. bridges including rip-rap retaining walls for one of the bridges, to be built in Stone Fort twps, Williamson Co. C. M. Scherertz, co. supt. of hwy, Marion.

## Minn., Marshall. 2 p.m., July 13

Constr. of bridges in Lyon Co.—R. D. Houdersheldt, co. aud.

## Ohio, Columbus. July 8

Constr. of a bridge in Plain twp. 70 yards superstructure, 53 yds. concr. superstructure, 10,200 lbs. reinf. steel, 4 cast iron scuppers, 166 yds. macadam pavement, removing the old bridge complete, 100 cu. yds. of excavation and fill.—Ralph W. Smith, clk. bd. of comrs.

## R. I., Providence. noon, June 30

Constr. of state bridges, numbered 20, 145 and 146, commonly known as the Wakefield bridge, South Kingston, in Centredale sluiceway, North Providence,

and the Centredale bridge, North Providence, and Johnston, R. I.—State Bd. of Pub. Roads, Room 12, State House.

## Regina, Saskatchewan. 4:30 p.m., July 6

Constr. of bridges and culverts.—H. S. Carpenter, Deputy Minister of Hwys., Government of Saskatchewan.

## S. Dak., Elk Point. 2 p.m., July 6

Constr. of a steel bridge across the Brule Creek in Richland Twp., of said county between sections six and seven. L. J. Johnson, aud., Union Co.

## Texas, Dallas. 10 a.m., July 1

The constr. of 5.857 miles of reinf. concr. pavement and all bridges, culverts, etc., on state hwy. No. 1, known as the Bankhead Hwy., running from the Dallas County line west through Arlington, all in Tarrant County, and being a section of the Fort Worth-Dallas pike.—Consulting engr., care of Court-house.

## Wisc., Beloit. 2 p.m., June 28

Constr. of an eight span reinf. concr. girder bridge 66 ft. wide and 249 ft. long. G. E. Heebink, city engr. Klug & Smith, Consulting engrs., Room 40, Mack Block, Milwaukee.

## MISCELLANEOUS

## Ia., Montezuma. noon, July 7

Constr. of Drainage improvements in Bear Creek Drainage District No. 2 of Poweshiek Co. Said improvement involves the straightening of the Bear Creek for a distance of about 2½ miles by a continuous new channel, with an average depth of 11 ft., 35 ft. and 40 ft. bottom, one-half ft. to 1 ft. slopes, and 5-ft. beams, and also Cub Creek lateral, leading into same; main channel involves the removal of approx. 211,420 cu. yds. of earth, and Cub Creek lateral involves the removal of approx. 28,023 cu. yds. earth.—W. C. McKee, co. aud.

## Pa., Ebensburg. noon, July 2

Bids for one five-passenger touring car for use of the county engr., the same to be equipped with cord tires. Herman T. Jones, co. controller.

## Del., Wilmington. 8 p.m., June 30

Bids for furnishing of three automobiles for the use of the three chiefs of the Wilmington Fire Dept. These automobiles to be of the roadster type, two-passenger.—Fire Comm. of the Council.

## ROADS AND STREETS

**Ala., Birmingham**—Several paving projects discussed by city comm. City will receive bids for paving of Eleventh Ave. north from 13th to 26th St.

**Ark., Fordyce**—Work on paving of streets in the business districts has been suspended until a new supply of cement arrives. Street running north and south from the cotton belt station to the Howell house, and the one running from the post office on Main St. east to the Rock Island station have been completed. Street from the post office on Main St. to the courthouse is yet to be paved.

**Cal., San Francisco**—Various improve. and public repairs about San Francisco have been submitted by city planning committee of the Civic League of Improvement Clubs and Associations. The recommendations of the committee include clearing and a general clean-up of the Great highway, repair of the pavement of Fifteenth ave., between Railroad ave. and San Brune ave., completion of Marina blvd., repair of sidewalks surrounding Hamilton square, repair of sidewalks on the west side of Stanyan st., between Fell and Fulton, and repair and smoothing of Pine, Bush and Post sts., in congested district.

**Cal., Sacramento**—A tentative program of 39.25 miles of additional highway in Sacramento County, to be built if the proposed \$1,300,000 bond issue is voted, was presented and passed at a meeting of the Co. Good Roads Com. The Elvas cut-off from Ben Ali to Sacramento, hitting the city limits at Thirty-first St., has been suggested as the most expensive piece of new roadway, costing approximately \$400,000, because a bridge would have to be built over the American River.

The proposed pieces of improved roads follow: Six mi. Perkins. Twelve-Mile House, \$138,000; 6 miles, east end Plymouth Road to Amador County line, \$138,000; 3 miles Riverside Road, city limits-pocket road, \$72,000; 4 miles west atomas Levee to Sutter-County line, \$50,000; 1.5 miles Elverta-Placer Co. line, \$36,000; 2.75 miles Pocket Bridge to Lower Stockton Road, \$70,125; 1.75 mi. Seven-Mile House on Upper Stockton rd. to Lower Stockton rd., \$44,625; 2 miles Sheldon-Wilton, \$75,000; 1.5 miles Walnut Grove to San Joaquin County line,

\$37,500; 2.75 miles Rio Vista Bridge to Sherman Island Ferry, \$68,750; 3 miles Ben Ali-Elvas cut off, \$400,000; 1 mile change of line on Lower Stockton road, double S curve, \$30,000; 4 miles Vorden-Glann cut off, \$100,000.

**Cal., Dixon**—The laying of the top-dressing of Warrenite-Bitulithic on the concreted streets of Dixon has begun and a block or two on the main street will be open for use by the last of the week.

**Cal., Sacramento**—Eighteen members of Good Roads Committee of Chamber of Commerce have been named to represent Sacramento as Members of Advisory. Capacity of Federal Hwy. Council.

**Cal., Pomona**—City receives bids in summer paving 6 streets, 5 in. concrete with ¾ in. asphaltic oil surface, expansion joints, etc. Cost to exceed \$25,000. C. E. Bayley, city engr.

**Cal., Stockton**—Bd. Supervs. San Joaquin Co. having plans prepared grading and paving 3¼ mi. Hammer Lane, 12 ft. wide, 2 mi. Waterloo Rd., 16 ft. wide, and 4½ mi. Copperopolis Rd., 12 ft. wide, 2 in. oiled macadam surface on 6 in. gravel base. Cost \$35,000, \$25,000 and \$45,000, respectively. F. E. Quail, Stockton, engr.

**Cal., Stockton**—Contracts will be let early in July for the construction of three county bridges, one over the Diverting Canal on the Copperopolis Road and one over canal at the Lower Sacramento Road and over on the Acampo-Lockeford Road. Estimated cost between \$75,000 and \$100,000.

**Cal., Yuba City**—Co. Engr. Edward von Geldern was instructed to prepare plans and estimates for asphalt macadam type on the Nicolaus-Sacramento County line road.

**Col., Oroville**—Part of the road construction in Butte County under the \$1,800,000 Good Roads Bond issue will be discontinued indefinitely, because of inflated costs. According to a decision of Butte County Board of Supervisors, bids will not be asked on any road that under the budget was estimated to cost more than \$8,000 a mile. Motion of the board calls for indefinite postponement of construction upon roads of a better type than asphalt macadam.

**Conn., Bridgeport**—Bd. Pub. Wks. plans to extend Broad St. from Congress St. to Washington Ave. About \$10,000. J. A. McElroy, city engr.

**Del., Wilmington**—The Street and Sewer Dept. plan the opening of new streets and repaving work at a cost of \$15,000.

**Fla., Leesburg**—City voted \$65,000 bonds to pave various streets with asphalt, also extend sewerage and water-works system.

**Fla., Tavares**—City will receive bids until 1:30 p. m. July 14 for from \$40,000 to \$60,000 of paving bonds. R. L. Nutt, mayor.

**Ill., Belleville**—Council passed an ordinance for resurfacing East Main Street with reinforced concrete at \$31,815, or about \$10 per front foot for property owners. Bids will be advertised at once.

**Ill., Joliet**—County Court has authorized the paving of Center St., Nicholas St. and Pine St., at an estimated cost of \$15,594, and \$22,884 and \$12,502, respectively.

**Ill., Silvis**—Board of Local Improvements passed a resolution of 15th St. paving at an estimated cost of \$26,826. Wallace Trichler, engr.

**Ind., Evansville**—No bids were received June 7 by Willis Copeland, County Auditor, for the construction of Elsterhold Road in Union Twp.

**Ind., Monticello**—No bids were received June 8 by F. E. Winston, auditor of Wahite County, for the construction of roads as follows: Crushed stone, in Princeton Twp., Joseph Hurley Road; gravel, Big Creek Twp., Harman Schroeder.

**Ind., Indianapolis**—Bd. of Public Works passed resolution of necessity to make improvements by grading and paving roadway with wooden block, asphalt, bituminous conc. laid on a 6-in. gravel foundation the first alley of Northern Ave. from E. P. L. Cornelius Ave. to W. P. L. Blvd. Pl. Geo. Lemaux, Pres.

**Iowa, Davenport**—A committee has been appointed to investigate the condition of Third St. and Seventeenth Ave. East Moline. About 80 ft. needs paving. A contractor submitted a bid to do the work for \$800.00.

**Kan., Junction City**—Fifteen thousand dollars is available for immediate use for road improvement at Fort Riley. Contracts will be let at once.

**Ky., Frankfort**—Route of Louisville-Paducah Highway decided by road officials and representatives of Livingston Co.

**Ky., New Albany**—Deciding to improve River Road in Franklin Twp., and New Albany and Jasper Road in Georgetown Twp., under state supervision. Bd. of Co. Comrs., New Albany, forwarded plans and specifications to State Highway Comm.



**La., New Orleans**—Twenty sts. are to be paved and three repaved, according to communication submitted to City Comm. Council by Sam Stone, comr. of public property, which was approved.

**La., Pointe a la Hache**—J. C. DeArms will survey the new line of roadway in road districts two and three, extending from the Orleans parish line to the U. S. fort reservations at Fort Jackson, a distance of 70 miles, at \$38 a mile.

**Md., Cumberland**—City Engineer has been authorized to draw up plans for the paving of Fayette St., Fourth St. and Pennsylvania Ave., Beall St., Emily St.

**Md., Cumberland**—Sealed bids will be received till July 6 for purchase of road bonds to amount \$95,000. Angus Ireland, county clk.

**Md., Elkton**—County Comrs. have been petitioned by residents of 9th District to gravel road from Calvert to Farmington, a distance of three miles, and to erect a bridge over Sandy Branch, between First and Second districts.

**Mass., Westfield**—Engr. D. N. Merrill of Brookline will begin survey of South Hampton Hwy. Hampden Co., Comrs., have allotted \$50,000 toward cost of construction of this part of hwy.

**Mich., Grand Rapids**—Requests for widening of Division Ave., Fulton St. to Wealthy St., again were before the city comm. City Engr. Clifford Page will draw up an estimate of cost of improvement. Property owners have decided roadway should be opened to width of 86 ft., taking necessary 20 ft. from property on east side of the ave. It now is requested that sidewalks be made 12 ft. wide, leaving 62 ft. of roadway.

**Minn., Carlton**—Carlton Co. Bd. rejected Cloquet-Duluth road bids. A call for new bids will be made.

**Miss., Grenada**—Grenada Co. voted \$300,000 of road bonds. Chairman Co. Supervisors.

**Miss., Magnolia**—No bids were received for \$100,000 of road bonds of Fourth Separate District of Pike Co. Chairman County Supervisors.

**Miss., Clarksdale**—Comm. John Hooks presented a resolution which has been accepted by bd. of city comrs. for paving of more than 15 sections of streets of city. Entire specifications call for paving of nearly three miles of a "permanent form of paving to be selected by mayor and bd. of comrs." Bids have been advertised for graders, tractors and other equipment materials to be used in the street improvement work, which will begin immediately.

**Miss., DeRma**—Bd. of Supervisors ordered an election to be held July 15 to float an additional \$200,000 bonds for good roads.

**Miss., Winona**—An election was held in the county to determine whether Beat 4 should issue bonds for building and maintaining of hard-surface roads. Election overwhelmingly carried in favor of the issuance of the bonds. Districts 1 and 2 already have separate road districts, and with Beat 4 falling in line it is confidently expected that Beats 3 and 5 will soon follow the example of the others and join in the good roads movement that is sweeping the county.

**Miss., Grenada**—Grenada Co. plans to issue \$300,000 bonds to build hard surfaced roads in Beats 1, 2, 3 and 4. Address K. Maltling, Grenada. Engineer not selected.

**Mont., Harlowton**—Wheatland Co. plans to gravel surface 7.25 mil. Harlowton-North and South Rd., 16 ft. wide. Address J. N. Edy, State Highway Engr.

**Mont., Kalispell**—It is planned to gravel 3 mi. of road in Flathead Co. by day labor; estimate, \$31,581.

**Nev., Elko**—Road planned between city limits and plant of Catin Shale Oil & Products Co., distance of about 1 mi. Address Co. Clk. of Elko Co.

**Nev., Reno**—Repairs to Pyramid Lake road will soon start. Road by way of Spanish springs is already in good shape. Reno-Verdi and Reno-Glendale roads are being improved; several branch roads are also receiving attention. H. G. Douglass, Co. Rd. Supt.

**N. J., Belvidere**—Warren Co. plans to pave 12 mi. Morris Turnpike, 20 ft. wide,

concrete, estimate \$540,000. Address H. W. Vetter, engr.

**N. J., Irvington**—City plans to pave various streets, involving 70,000 sq. yd. concrete and asphalt block, estimate \$500,000. Address I. J. Casey, City Engr.

**N. J., Paterson**—Bd. of Freeholders, Passaic Co., plans to pave road between Paterson and Passaic also main street in each town, 4 mi. Address C. Ferguson, Co. Engr.

**N. J., Burlington**—Co. Engr. Logan has prepared plans and specifications for improving Warren St., Beverly.

**N. J., Hoboken**—City plans to pave Monroe St. from 8th to 9th Sts., 10th to 11th Sts. and 13th to 15th Sts., 6th St. from Jackson to Monroe Sts., and 9th St. from Monroe to Adams Sts., asphalt. Cost to exceed \$200,000. D. A. Hagerty, clk.

**N. J., Passaic**—A granite block and concrete roadway is to be laid in Main Ave., between Harrison St. and Highland Ave., according to Comr. William A. Reid. Garwood Ferguson, County Engineer.

**N. Mex., Carlsbad**—Bids will be readvertised by R. A. Toffelmire, city clk., for paving, curbing and draining certain streets. F. L. Hancock, C. E., Box 502, Carlsbad, N. Mex.

**New Mexico**—L. A. Gillett, state hwy. engr., Capitol Bldg., Santa Fe, soon receives bids graveling Magellen & Santa Fe. Rita Federal Aid projects in Silver City, Grant Co. About \$300,000.

**N. Y., Huntington, L. I.**—Huntington roads to be improved. Bids will soon be advertised for construction of concrete sidewalks, a distance of 1-2 mi.; also building of a section of a 16-foot conc. road.

**N. Y., Mineola, L. I.**—Nassau Co. banks bought \$790,000 worth of road bonds. Following seven banks took \$100,000 each: Bank of Lawrence, Nassau Co. Trust Co., First Nat. Bank Hempstead, First Nat. Bank Freeport, Glen Cove Bank, Oyster Bay Bank and Bank of Rockville Centre, took remaining \$30,000.

**N. Y., Albany**—City plans to pave various streets, estimate \$250,000. Address F. R. Lanigan, City Engr.

**N. Y., Binghamton**—City plans to pave 45,000 sq. yd. of streets with asphalt, concrete, brick and wood block, estimate \$40,000. Address W.

**N. Y., Portchester**—City plans to pave 40,000 sq. yd. of streets with asphalt block. Address C. Astudwell, City Engr.

**N. Y., Tonawanda**—City plans to pave 21,000 sq. yd. of streets with asphalt, brick and bitulithic. Address T. W. Barally, City Engr.

**N. Y., Brooklyn**—Bd. granted request of Boro Pres. Riegelmann for final authorization of following local improvements here:

Paving 81st St., from 20th Ave. to 21st Ave.; estimated cost, \$13,300.

Resolutions were adopted initiating the following local improvements in Queens Boro.:

Grading Gosman Ave. from Barnett Ave. to Queens Blvd.; estimated cost, \$16,400.

Paving with asphalt (permanent pavement) Clermont Ave., from Grand St. to Hull Ave.; estimated cost, \$22,000.

Paving with asphalt (permanent pavement) Junius St., from Sutter Ave. to Blake Ave.; estimated cost, \$9,200.

Paving with asphalt (permanent pavement) Newport St., from Van Sinderen Ave. to Hinsdale St.; estimated cost, \$9,000.

Paving with asphalt (permanent pavement) E 10th St., from Avenue O to Avenue P; estimated cost, \$15,900.

**N. Y., Brooklyn**—On recommendation of the Comm. on Finance and Budget, Bd. of Estimate adopted resolutions initiating following local improvements in Brooklyn: Regulating and grading E. 29th St.; estimated cost, \$6,000. Regulating and grading, where necessary, 81st St.; estimated cost, \$4,300. Paving with asphalt (permanent pavement), where not already paved, 47th St.; estimated cost, \$35,700. Paving with asphalt (permanent pavement), 81st St.; estimated cost, \$13,000.

**N. Y., Jamaica, L. I.**—Boro Pres. Connolly sent out call for meeting of Jamaica local bd., June 24, to consider regulating, grading, curbing, recubing, flagging for a width of not less than 80 ft., constructing receiving basins, sewer manholes and appurtenances, and paving of Bell Ave. from Crocheron Ave. to Broadway in Bayside.

**N. Y., Mineola, L. I.**—First step in plan to improve rds. of county taken when Bd. of Supervisors voted to improve Searington rd. with aid of Fed. and state appropriations. This road will begin near Searington and run northerly distance of 1.37 mi. Total cost will be \$83,100.

**N. Y., Rochester**—City plans to pave 80,850 sq. yd. of streets with sheet asphalt, brick and Medina block, estimate \$621,350. Address C. A. Poole, city engr.

**N. Y., Syracuse**—City plans to pave 100,000 sq. yd. of streets. Address H. C. Allen, city engr.

It is planned to expend about \$14,810 for paving Henry St. Address City Clk.

**N. C., Asheville**—At a quarterly meeting of State Hwy Engrs. of the western district a report of the total amount of work done in the district was made, and the figures showed that 343 miles of road in 22 counties has been built, cost of construction estimated to be \$4,170,332. Of this amount approximately \$2,039,89 was federal aid, \$791,149 state aid, and \$1,339,293 county apportionment. This covers 37 projects ranging in length from a mi. and a half to 36 mi. Four projects have been completed, Hickory Nut Gap road, project number 2; Ridgecrest and McDowell county, project number 3; Icard twp. in Burke Co., a section of the central hwy., and a portion of the Dixie hwy. between Asheville and Hendersonville, a total distance of 21.28 miles of highway completed. This completed mileage has cost approximately \$161,121. There are now 13 projects under construction aggregating 821 miles, the estimated cost of which is \$1,527,891. Total mileage as now outlined for constr. in the western division is 382 miles. Survey is completed on 343 miles, which is 93 per cent of the total mileage.

**N. C., Dobson**—Surry Co. plans to hard-surface 5 mi. Fancy Gap Rd.

**N. C., Winston-Salem**—At meeting of Co. Comrs. order made by board that \$150,000 bonds be issued as soon as possible to secure funds with which to connect good roads in several of the twps. of co.

**N. C., Winston-Salem**—State Hwy. Comm. will construct roads from Lewisville to Styers Ferry, distance 6 mi.

**N. C., Charlotte**—At recent primary election petitions were signed authorizing an issue of \$1,000,000 in 20 yr. serial bonds for hwy. constr. proceeds of bond issue to pave 8 main hwy., including Wilmington-Charlotte-Asheville Hwy., Bankhead Nat. Hwy. and others.

**N. C., Charlotte**—Bids for purchase of city's refunding bonds of \$75,000 were rejected. Bonds were issued 30 years ago for improvement of macadamized streets.

**N. C., York**—Citizens of York and Broad River will soon vote on bond issues for hwy. imp. Broad River will pass on an issue of \$50,000 while York will ballot on a bond issue of \$100,000.

**N. C., Yanceyville**—Clerk Bd. of Co. Comrs. Robert T. Wilson calls for sealed bids until July 12 for 5½, 5% or 6 per cent J. & J. 18½-year (average) road improvement coupon or registered bonds to the amount of \$100,000.

**Ohio, Columbus**—Tabulation of bids, State Hwy. Dept., contract letting, H. S. Atkinson, publisher, Hartman Bldg., Columbus, Ohio:

No. 1, Ashland Co., alternate bids, Ashland-Wooster rd., Foster-Heffner Const. Co., Dayton, O., mono. brick, \$175,997.79; concrete, no bid.

No. 2, Coshocton Co., alternative bids, New Comerstown-Coshocton, T. J. Norman & Son, W. Lafayette, O., mono. brick, \$122,853.94; concrete, no bid.

No. 3, Erie Co., Lima-Sandusky, Edward F. Hoffman, Castalia, O., \$124,216.99.

\*No. 4, Franklin Co., contracts 1 and 2, National Rd.; Contract 1, Type A, brick; B, brick on rolled base; C, asphalt; Contract 2, brick. Billiter & Connell, West Jefferson, O., Contract 1 "B," \$100,864.61; Franklin Asphalt Paving Co., Contract 1, Type C, \$130,971.89; Contract 2, \$22,254.15. A. G. Pugh, Columbus, O., Contract 1, Type C, \$131,065.20; Contract 2, \$22,275.17. A. W. Burns & Co., Columbus, O., Contract 1, Type B, \$101,711.76; Contract 2, \$22,296.20.

No. 5, Gallia Co., Jackson-Gallipolis, Miller Bros., Gallipolis, O., \$179,218.95.

No. 6, Geauga Co., Cleveland-Meadville, no bids.

No. 7, Guernsey Co., "Fairview Corp." on National Road, C. E. Wilson, Barnesville, O., \$22,227.80.

No. 8, Guernsey Co., Old Washington Corp. of National, no bids.

No. 9, Guernsey Co., Cambridge-Coshocton, no bids.

No. 10, Jackson Co., Chillicothe-Jackson, no bids.

No. 11, Jackson Co., Chillicothe-Jackson, no bids.

No. 12, Knox Co. Bridge, Mt. Vernon-Coshocton, no bids.

No. 13, Sandusky Co., alternative bids, Fremont-Perrysburg, Type A, brick; Type B, bit. concrete. McModern Const. Co., Fremont, O., \$425,512.02 Type A; \$413,819.01 Type B.

No. 14, Union Co., alternative bids, Columbus-Marysville, Type A, bit. macadam (A); Type B, bit. mac. (T). J. C. McCann, Columbus, O., Type A, \$89,870.27; "B," \$85,812.17. T. V. Van Camp, Cincinnati, O., Type A, \$91,493.51; Type B, \$84,720.01. Curtis V. Rector, Muncie, Ind., Type B, \$86,976.57. Fuelling & Krudop Const. Co., Fort Wayne, Ind., Type A, \$90,954.43. C. O. Hurd, Marysville, O., Type B, \$86,625.89.

No. 15, Union Co., alternative bids, Columbus-Marysville, Type A, bit. macadam (A); Type B, bit. macadam (T). T. V. Van Camp, Cincinnati, O., Type A, \$177,684.65; Type B, \$167,629.00. Billiter & Connell, W. Jefferson, O., Type A, \$178,199.21; Type B, \$170,657.96. D. Allder, Findlay, O., Type A, \$180,198.65; Type B, \$171,687.40. J. C. McCann, Columbus, O., Type AA, \$177,182.15; Type B, \$169,640.90.

No. 16, Wayne Co., alternative bids, Cleveland-Wooster, Type A, mono. brick; Type B, concrete; Type C, bit. macadam. Smith Const. Co., Youngstown, O., Type C, \$151,417.79. Lee Griggs & Anderson, Millersburg, O., Type A, \$151,287.56.

**Ohio, Toronto**—Floto Bros. will begin paving of the road between this city and Steubenville within a few days. Co. Engr. John Leech and State Engr. C. W. Fawcett have agreed on all the details concerning plans which had been in dispute.

**Ohio, Dayton**—Final legislation has passed council for paving of East Monument A Ave. from Main to Kenton; estimated cost, \$37,000. Brick will be specified. The placing of asphalt on the present brick surface at a cost of \$21,000 is also under consideration.

**Ohio, Delta**—Co. Surveyor Bernath has program for spending \$100,000 in road improvements this year in Fulton Co.

**Ohio, East Liverpool**—The Allison Harris Construction Co., which has the contract for the St. Clair Ave. paving, has begun to receive material and will begin work at once. Brick on a concrete base is specified. J. N. George is engr.

**Ohio, Fremont**—A quarter of a million dollars worth of road improvement bonds offered for sale by Sandusky Co. Comrs. will be purchased by Industrial Comm. at Columbus, according to information received here by Co. Aud. Frank E. Siegenthaler. Money will be used in defraying county's portion of expense for improvement of Fremont-Bowling Green rd., Sandusky and Clyde rd., Memorial Parkway and Maumee Pike.

**Ohio, Lisbon**—Improvement of road from West Point to Morgan Monument to be paved by co. Legislation for improvement has just been passed.

**Ohio, Newton Falls**—Engr. Wade Dhidler, of Youngstown, has presented plans for paving and sewer work to be done

here this summer and of all unpaved streets and the improvement of such as have been paved heretofore. Plans have been approved and legislation authorizing the work is now pending.

**Ohio, Oak Harbor**—Vill. Council offers \$13,500 municipal bonds for sale June 23 for improving Maple St.

**Ohio, Sandusky**—Contracts will be awarded within three days for improvement of Anderson and Lockwood Sts., bids on which have just been opened.

**Ohio, Tiffin**—Bonds will be issued to carry out street improvement and repair program completed by city council. Plans call for \$7,500 issue at once. Co. comrs. and trustees of Clinton Twp. will co-operate with city in meeting expense of street work.

**Ohio, Tiffin**—Legislation for paving N. Sandusky and River Sts. in co-operation with county and twp, passed council.

**Ohio, Vermillion**—Mayor Williams states that legislation for paving a Min St. will be immediately enacted. Bond issue will be necessary. Co. will pay half cost, which will be about \$36,000. Co. Engr. Schultz will prepare plans.

**Ohio, Akron**—Plans are being prepared for the widening of W. Market St. from Howard to Cherry St.

**Ohio, Dayton**—Widening of W. Third St., from Abbey Ave. to Gettysburg Ave., is proposed in a resolution passed by city comm. It is the desire to establish a paved roadway 45 ft. in width instead of 36 so as to accommodate two street car tracks.

**Ohio, Warrensville**—Bids will be received shortly for grading, draining, curbing and brick, concrete, asphalt or macadam paving on Cottage Grove Dr., Colchester and Princeton Rds.; estimate, \$78,000. Address F. A. Pease Engineering Co., Marshall Bldg., Cleveland.

**Ohio, Akron**—Survey of the road through Cuyahoga Valley between this city and Cleveland is to be made at once. New road will be about 12 mi. long and will follow tow path along the old Ohio canal.

**Ohio, Cleveland**—Resolution adopted for construction of sidewalks on East 114th St., from Woodland Ave. to a point 160 ft. south. C. J. Benkoski, city clk.

**Ohio, Hillsboro**—Street paving bonds have been sold to the Merchants National Bank and paving for which Mr. Murdock has contract will proceed at once.

**Ohio, Middletown**—City Council passed ordinance to establish grades on several streets. John Kunz, city clk.

**Ohio, Findley**—Improvement of West Front St., from the end of the present pavement to Western Ave., planned. Work consists of grading, curbing, guttering, cross walks, draining and paving with brick, sheet asphalt, asphaltic concrete. Kentucky Rock asphalt or conc. Address W. E. Houck, Vice-Pres. of the Council.

**Ohio, Greenville**—City plans to pave and grade Gray Ave., 11th and Dover Sts., 30 ft. wide, involving 5,600 sq. yd. vitrified brick or wood block on conc. base, 1,100 lin. ft. concrete curbing, 1,100 lin. ft. guttering and 200 cu. yd. excavation, estimate, \$45,000. Address F. Townsend, City Engr.

**Ohio, Alliance**—Paving of state road from Liberty Ave. to Mahoning Ave. and Liberty Ave. from State St. to College St., planned. Address City Council.

**Ohio, Ashtabula**—Sidewalks will be constructed on both sides of Harbor Av., between Pacific and Mary Sts.

**Ohio, Toledo**—Street oiling in city is well under way. Work has been finished in Ohmer Park South End, and part of the East End. It is estimated total cost of oiling will be about \$30,000 and that it will be necessary to use approximately 200,000 gallons of oil.

**Okla., Ada**—No bids were received on June 10 for any of the paving districts. Bids will be readvertised as soon as bond market improves.

**Okla., Mangum**—Bd. of Comrs. have adopted plans and specifications for paving District No. 2; total cost, \$75,000.00. Johnson & Benham, consulting engineers, 8th floor, Firststone Bldg., Kansas City, Mo.

**Ont., Stratford**—City Council adopted City Engr. Manson's reports providing

for the resurfacing of pavements at a cost of \$58,000.

**Ont., Toronto**—City Council struck out paving of Walmer Rd., from Bridgman Ave. to Davenport Rd., but approved the grading of Woodbine Ave., from Kingston Rd. to Gerrard St., at a cost of \$285,000.

**Ont., York Twp.**—Township Council authorized an expenditure of \$10,000 for construction of concrete sidewalks on Brownhill, Watford and Eglinton Aves. Engineer, Frank Barber, 40 Jarvis St., Toronto.

**Ore., Marshfield**—City receives bids about July 25, paving, concrete curbing, building sidewalks and sewers in Bway., S. About \$29,500. E. K. Burton, city engr.

**Ore., Union**—City retained L. C. Kelsey, consult. engr., Portland and Nampa, Idaho, to prepare plans paving various streets. About \$35,000.

**Pa., Harrisburg**—Street Dept. recommended that all bids for surfacing of Pawnee and Seneca streets be rejected and that the city enter into a contract with the R. S. Rathbun Company upon a cost plus 15 per cent basis, the work not to exceed \$1.60 per sq. yd. The lowest bid was considerably in excess of this amount.

**Pa., Pittsburgh**—City Council passed ordinance for widening of Baum Blvd. between Rebecca St. and South Highland Ave., extending it to 60 ft. Cost about \$100,000.

**Pa., Warren**—Bids will be asked for by County Engr. of Warren Co. for permanent improvement of S. Main St. Estimated cost, \$31,000.

**Pa., New Castle**—City plans to pave various streets involving 15,000 sq. yd. brick, concrete, and asphalt, estimate \$90,000. Address C. H. Milholland, City Engr.

**Pa., Oil City**—City plans to pave various streets involving 15,000 sq. yd. brick, concrete and bituminous pavement, estimate \$100,000. Address B. B. Weber, City Engr.

**Que., St. Lambert**—Town Council soon receives bids building concrete roadway, 20 ft. wide, along water edge from Victoria Bridge to city limits. About \$400,000. E. Drinkwater, St. Lambert, engr.

**Que., St. Lambert**—Town plans to expend \$308,700 for sidewalks and pavements.

**R. I., Newport**—Bd. of Aldermen authorized issuance of \$80,000 in bonds for Kay St. and other purposes.

**S. C., Florence**—City will vote on issuance of \$575,000 of bonds as follows: \$350,000 street and sidewalk; \$100,000 water works and sewers; \$125,000 funding; probably 6 per cent. 30-year. The mayor.

**S. C., Abbeville**—Abbeville Co. plans to improve 15 mi. Abbeville-Honeapath Rd. F. H. Murray, Columbia, archt. Noted April 15.

**S. D., Rosebud**—Edmunds Co. is offering \$75,000 refunding bonds and \$75,000 for new work on co. roads. State and Federal aid project covering 14 mi. east and west from Ipswich, S. D., to the East Co. line amounting to \$121,000 has been let, and work on same started. Co. Hwy. Dept. has in operation two large tractors with blade grader and planer equipment at work and in addition have fire dist. moving outfits under contract putting in grade work on county road systems over county.

**Tex., Dallas**—Bd. of City Comrs. approved petition to pave Park Row. City engr. instructed to make plans and specifications for work.

**Texas, Austin**—Travis Co. having plans prepared clearing, grubbing, grading, gravel surfacing and draining 3 mi. Austin-Oak Hill Rd., 16 ft. wide, involving 123 cu. yd. 1:2:3 and 20 cu. yd. 1:2:5 concrete, 8,700 cu. yd. unclassified earth and 300 cu. yd. rock excav., 27,280 sq. yd. bituminous macadam, 3,618 cu. yd. gravel and 3,750 lb. reinforcing steel. About \$26,665. H. W. Nolan, 511 Scarbrough Bldg., engr.

**Texas, San Marcos**—Hays Co. had plans prepared grading, graveling and draining 18.9 mi. Highway 29-B, Federal Aid Project 178, 15 ft. wide, also building concrete bridge over Blanco River,



involving 32 acres clearing and grubbing, 3,100 cu. yd. gravel, 672 lin. ft. c. i. pipe, 488 cu. yd. 1:2:4, 40 cu. yd. 1:3:6 and 60 cu. yd. 1:2 1-2:5 concrete; gravel surfacing and draining 9.68 mi. Highway 20-A, Austin-Fredericksburg Rd. 12 ft. wide, 19.5 acres clearing and grubbing, 23,200 cu. yd. earth and 2,200 cu. yd. rock excav., 7,761 lb. reinforcing steel, 203.7 cu. yd. Class "A" and 49.3 cu. yd. Class "B" concrete. About \$101,424 and \$24,840 respectively. J. W. Puckett, Buda, engr.

**Tenn., Jonesboro**—A proposition to issue Refunding and Street bonds to the amount of \$15,000 will be submitted to the voters at an election on July 8.

**Tenn., Pulaski**—Clk. Co. Court R. H. Harris calls for sealed bids until July 2 for 6 per cent J. & J. 1-35-year (searial) hwy. coupon bonds to the amount of \$350,000.

**Texas, Big Springs**—A proposition to issue road bonds to the amount of \$350,000 will be voted upon at an election on June 26.

**Texas, Lubbock**—Grading and other preliminary work for street paving at this point is now well under way and officials of the construction company report it expects to have same completed before cold weather sets in.

**Va., Independence**—Clk. Bd. of Supervisors T. E. Brannock calls for sealed bids until July 1 at 2 p. m., for 6 per cent, semi-annual road bonds to the amount of \$90,000.

**Va., Lynchburg**—Bids rejected by Committee on Streets for paving Blue Buckle St. and widening a portion of 12th St. Address City Engr.

**Wash., Grandview**—Work of grading for the \$100,000 paving program to be put through here this summer is already under way. City is installing new iron water mains in paving district.

Public spirited citizens of the town made up a \$10,000 pool to take over the last bonds of the district that there might be no hitch in the program.

**Wash., Grandview**—Work of grading for the \$100,000 paving program is already under way. Citizens of town made up a \$100,000 pool to take over last bonds of dis.

**Wash., Seattle**—Sealed bids will be received till June 24 for purchase of \$1,000 coupon bonds of alley in Block 2, Francis R. Days. La Grande addition. H. W. Carroll, co. clk.

**Wash., Colville**—A resolution to grade and curb several blocks has been passed by council.

**W. Va., Chester**—Council is arranging for paving of roads between the corporate limits over which the Lincoln Hwy. will be routed.

**Wis., Fond Du Lac**—The Co. State Rd. and Bridge Com. of Fond du Lac Co. will receive sealed proposals for grading and surfacing the following road: Fond du Lac-Dotyville, extending west 3.57 mi. from village of Dotyville. Excav., earth, 15,131 cu. yds.; conc. in culverts, 111.4 cu. yds.; guard rail, 910 lin. ft.; ditching, 107 cu. yds.; 16-ft. gravel surfacing, feather edge type, 33,400 sq. yds.; 1st, on job complete, including all items; 2d, on the grading, culverts and ditching (omitting guard rail and surfacing). J. S. McCullough, County Hwy. Engineer.

#### BIDS RECEIVED AND CONTRACTS AWARDED

(\* Indicates Contracts Awarded)

**\*Ala., Anniston**—City awarded contract to J. F. Morgan Paving Co., Birmingham, Ala., at \$96,705, to pave Noble St. with asphaltic concrete.

**Ala., Birmingham**—Comm. authorized city engr. to accept bids for paving two places at cost totaling \$47,583.79. At estimated cost of \$42,700, 16th St. north will be paved. A bid was also accepted for paving 8th Court. cost \$2,462.

**\*Ala., Marion**—R. N. Lacey, Selma, Ala., received contract from city to pave sidewalks in residence sections.

**Ariz., Flagstaff**—White and Miller, of Yuma, were low bidders for paving a portion of the Old Trails Hwy. which runs through main street of Flagstaff, at \$72,000.

**\*Ark., Mena**—Contracts were awarded for two highways in Polk Co., Mena-Big Fork road, 23 mi. long, and the Mena-Oklahoma rd., 16 mi. long. Contracts awarded to Early & Jones of Sheridan, Ark., and the Maxwell Construction Co. of Columbus, Kan. Bids for both roads totaled \$379,942.

**\*Ark., Paragould**—E. J. Scott, Rialto Bldg., St. Louis, awarded contract for culverts and road embankment on 23 miles of road in Green Co., at \$120,800.

**\*B. C., Victoria**—Dept. Pub. Wks. let contract paying 1.9 mi. Rds. 5 and 9, Lulu Island, Richmond Dist., asphaltic concrete on concrete base, to Harrison & Lamond, 501 Pacific Bldg., Vancouver. About \$55,000.

**Cal., Chico**—Bids opened on Gridley-Colusa Rd. call for \$25,000 per mile. Co. Engr. M. C. Polk's estimate of cost of this road was \$12,500 per mile. No bids were received for work on Cana Rd. north of Chico. For the Gridley-Colusa Rd. only two bids were received. For Thermalito Rd. Chico Contracting Co. bid \$20,000 a mile.

**\*Cal., Yuba City**—Sutter Co. Supervisors awarded contract for building 3.03 mi. of Nicolaus rd. between Bogue and Oswald to Federal construction Co.; bid, \$26,125 a mi. Contract for building 2½ mi. of asphalt macadam road, known as Nicolaus-Feather River hwy., was awarded to D. C. Howard of Chico at \$11,106 a mile.

**\*Cal., El Centro**—City let contract improving Lenroy, 5th, 6th Sts., et al, to G. R. Daley, McNeece Bldg., San Diego, about \$50,000. Work involves asphalt paving at \$0.35 per sq. ft., cement walks and curbs, \$0.21 and \$0.75, respectively.

**\*Cal., Los Angeles**—Bd. Supervs. Los Angeles Co. let contract building 6½ mi. cement curbs and gutters, Graham, Rd. Dist. 151, to F. Hoffman, 111 East 12th St., Long Beach. About \$75,000. This contract for completing job let to D. L. Gaskill in January, but abandoned by him when ¼ completed. Noted Jan. 15.

**\*Cal., Santa Monica**—City received bids improving 8,000 ft. San Vincente Blvd., 23 ft. wide, from J. D. Kneen Contg. Co., Dudley Bldg., Santa Monica, \$112,692; Braun, Bryant & Austin, Santa Monica, \$118,171; Fairchild-Gilmore-Wilton Co., Pacific Electric Bldg., \$121,961. Noted May 13.

**\*Cal., Visalia**—City let contract grading and paving 2½ mi. various streets, 1½ in. Topeka top on 3 and 4 in. base, cement curbs, concrete gutters, corrugated iron culverts, 6 and 8 in. storm drain, etc., to Federal Constr. Co., Call Post Bldg., San Francisco, \$224,533. Similar contract let to same company last year, but cancelled because of errors in proceedings.

**Cal., Sacramento**—Cal. Hwy. Comm. received following bid for Los Molinos to Red Bluff rd. from Lym S. Atkinson, Jr., Sacramento: Excav. without classification, 50,000 cu. yds., engs. estimate, \$1.15, \$57,500; bid, \$1.10, \$55,000. Class A Portland cement conc. (pavement), 14,300 cu. yds., estimate, \$11.50, \$164,450; bid, \$12.22, \$174,746. Class A Portland cement conc. (culv. and mon.), 400 cu. yds., estimate, \$23, \$9,200; bid, \$25, \$1,000. 12-in. corrugated metal pipe, 1,200 lin. ft., estimate, \$1.04, \$1,248; bid, \$1, \$1,200. 18-in. pipe, 650 lin. ft., estimate, \$1.15, \$747.50; bid, \$1.25, \$812.50. 24-in. pipe, 600 lin. ft., estimate, \$1.44, \$864.00; bid, \$1.50, \$900.00. Guard rail, 720 lin. ft., estimate, \$90, \$648.00; bid, \$1, \$720.00. Monuments (hauling and setting 108), estimate, \$234,819.50; bid, \$243,594.50. estimate, \$1.50, \$162; bid, \$2, \$216. Total

**\*Conn., Southington**—Antonio Di Marco, local cement and concrete contractor, awarded contract for building new curb on South Main St.

**\*Conn., Bridgeport**—City let contract improving various streets to Warren Bros. Co., 142 Berkeley St., Boston, surfacing \$1.79 per sq. yd., bituminous binder, \$11.50 per sq. yd., labor and material on cost plus 15 per cent basis. About \$300,000.

**\*Delaware**—State Highway Dept., Dover, let contract building 2.93 mi. highway from Tybouts to Hares Corners, 18 ft. wide, New Castle Co., Contr. 34, to R. Hopkins, 824 2nd Ave., Troy, N. Y., \$185,-

728; heavy filling Christiana Ave., Wilmington, to McLean Contg. Co., 1412 Fidelity Bldg., Baltimore, \$84,270.

**\*Fla., Jasper**—City awarded contract to Howard Bowdry, Birmingham, to pave streets; asphalt with 5-inch concrete base; work to be completed in business district by October 1; cost, \$69,000.

**\*Fla., Tampa**—City awarded contract to W. H. Kendrick to pave following streets: 20th St. from Nebraska to 9th Ave.; Jetton Ave. from Fremont to Francis Ave.; Gunby Ave. from Bayshore Blvd. to Hills Ave., and De Soto Ave. from Bayshore to Howard Ave.; \$3 per sq. yd. for paving; 75 cents per lineal ft. for curbing.

**\*Ga., Dawson**—The Pittman Construction Co. of Atlanta was awarded contract for paving the street on Main and Lee Sts.

**Idaho, Boise**—Project No. 37, 4 1-2 mi. of road on the Gooding and Rupert hwy. in Jerome co., was bid upon by two contractors, H. E. Cornell, \$117,068; Samuel Smith, \$105,269.60; taken under consideration.

Project No. 15, 8.9 miles on the Idaho-Pacific hwy. in Hannock county; J. J. Carroll & Co., \$117,408.35; Morrison & Knudsen, \$109,227.25. Taken under advisement.

Project No. 17, 8.9 miles of road on the Idaho-Utah highway in Bannock Co., J. J. Carroll & Co., \$109,110.61. Morrison & Knudsen, \$99,839.36. Taken under advisement.

**Ill., Rock Island**—The Henry W. Horst Co. of Rhode Island awarded contract for paving Mount Vernon Rd with Class A concrete at \$350,000.

**\*Ind., Cannelton**—Paulin Constr. Co., Cannelton, Ind., awarded contract for constructing the F. W. Grass Rd., at \$9,000.

**Ill., Chicago**—Bd. of Local Improvement gave approval for building a \$200,000 sewer to be located in Broadway and another in Ave. N at western limits of south side, to cost \$1,256,000.

**\*Ind., Indianapolis**—Bids received by bd. of public works for two sidewalk improvements. Marion Co. Constr. Co. bid \$3.20 a lin. ft. for cement sidewalks and curb on east side of Chadwick St. Abel Bros. bid \$2.06 a lin. ft. for cement sidewalks in Rochester Ave. Marion Co. Constr. Co. received contract for paving Capitol Ave. with asphalt at \$8.18 a lin. ft. Total bid was \$28,069.31.

**\*Ind., Terre Haute**—Carpenter Constr. Co. awarded contract for construction of a gravel road in Sugar Creek Twp., 2 miles in length, at \$120,680.

**Ind., Anderson**—Two bids on the I. W. Carr road, six miles north of Elwood to the Grant county line, were received by co. comm. Both bids were withdrawn when comrs. announced that successful bidder would have to complete the work this year. Bidders were the Harmon, McTurnan, Knotts & Harmon Company of Elwood, \$263,000, and the Madison Construction Co., of Anderson, \$245,000. The same firms nearly a year ago bid on the same road and at that time the Harmon company bid was \$182,000 and the Madison company's bid was \$197,000. The contract was let to the Madison co. but was rescinded during a controversy that followed a complaint of taxpayers.

**Ind., Indianapolis**—Bids have been received by the board of public works on four street improvements. Union Asphalt Cons. Co. bid \$7.72 a lineal foot on asphalt for the resurfacing of North st. from Ft. Wayne ave. to Massachusetts ave. Resurfacing of Massachusetts ave. between Ohio and Delaware sts., Mansfield Engineering Company, bid \$8.90 a lineal foot on asphalt and the American Cons. Co. bid \$9.19.

The American Cons. Co. bid \$9.10 a lineal foot on asphalt and the Mansfield Engineering Company and the Indiana Asphalt Paving Company each bid \$9.25 for the resurfacing of Massachusetts av. from Delaware st. to East street.

For resurfacing Massachusetts avenue from East street to Cornell avenue, the American Construction Company bid \$7.37 a lineal foot on asphalt, and the Indiana Asphalt Paving Company bid \$7.21. No bids were received on the re-



surfacing of South street from Alabama street to Virginia avenue or on the jacking of Park avenue from Fifty-first to Fifty-second streets.

**\*Ind., Indianapolis**—Frank Lawson received contracts for cement sidewalks and curbs in Thirty-ninth st. from Central ave. to Broadway, at \$3.10 a lineal foot, total bid \$4,910.40, and for grading the roadway at \$2.11 a lineal foot, total bid \$3,175.83. The Columbia Cons. Co. received the contract for a sewer in Blaine ave. from Ray street to a point thirty feet north of Wilkins street at \$4.50 a lineal foot, total bid \$2,205.

**\*Ind., Indianapolis**—Capitol Ave., from McCarty to Morris; asphalt roadway to Marion Co. Constr. Co., at \$8.18 per lineal foot.

**\*Ind., Mt. Vernon**—The bd. of Posey Co. Comrs., Millard Robison, aud., Court-house, let contr. for 7 roads to E. V. Green Constr. Co., Lawrence Thomas.

**\*Ind., Veray**—Bd. of Switzerland Co. let contr. for road to Albert Beckman, Rising Sun, Ind.

**\*Kan., Oswatimie**—Park Board let contract for paving driveway through John Brown Memorial park; also for the paving of a blvd. Amount \$6,816.50.

**\*Kan., Kansas City**—Spitcaufsky Bros. low bidders for grading 1½ mi. of highway in Reidy Rd., at \$65,688. H. A. Kepler low bidder for improving highways 2 miles west of Kansas side.

**\*Kan., Olathe**—Walsh Constr. Co. of Davenport, Ia., were awarded contract for Frisco R. R. work, including grading, concreting and laying track.

**\*Ky., Shelbyville**—Metzel & O'Hern of Newport were low bidders for reconstructing of Main St. with concrete pavement, at \$12,688. For construction of pavement on Adair Ave., at \$12,054; for rock asphalt pavement of Washington St., at \$12,952; for reconstruction of 5th St. with rock asphalt, at \$4,623.

**\*Ky., Louisville**—Contract for improving Pennsylvania Ave. let by Bd. of Public Works to Louisville Asphalt Co.; price, \$27,597.50. Same co. awarded contract to improve 38th St. for \$3,135.75.

**\*Ky., Louisville**—Lou. Asphalt Co., Floyd and Lee Sts., said city, awarded contract for the construction of three sections of road on Penn. Ave., at \$22,171, \$5,427 and \$3,136.

**\*Md., Frederick**—Co. Comrs. awarded contract for the M. J. Gorge Line Co. for the construction of two miles of improved road between Middletown and Harmony, at \$60,541.

**\*Mass., Leominster**—City Council, pub. service Comm. let contr. for roads to Framingham Constr. Co., Framingham, Mass.

**\*Mass., Newton**—City Council, Geo. E. Stuart, street commr., City Hall, West Newton, let contr. for curbing, walks, steps and driveways to Calvin G. Fletcher, 87 Granite St., Quincy, Mass.

**\*Mass., Norwell**—Town selectmen, W. J. Leonard, commr., let contr. for road in River St. to Arthur J. Mitchell, Central St., at \$19,000.

**\*Mass., Boston**—Dept. of Pub. Wks., Thos. P. Sullivan, commr., Rm. 508, City Hall Annex, let contr. for pavement in West Roxbury dist. to W. J. Barry, 431 Ashland St., West Roxbury dist., Boston, at \$115,567; in Brighton dist., to Prazzolo & Althre, 64 Frankfort St., East Boston, at \$9,508; in Franklin St., to Jas. Donerty, 133 Calumet St., Roxbury dist., at \$19,342; in Ashfield St., West Roxbury dist., to John Kelley, 5 Ulmer St., Roxbury, Mass.

**\*Mass., Boston**—City let contract bldg. 7,000 ft. artificial stone sidewalks, 7 ft. wide, on Congreve, Hastings, Walk Hill and Ashfield Sts., West Roxbury, to J. Kelley & Co., \$21,546; 3,350 ft. pavement, 44 ft. wide, on Washington St., West Roxbury Dist., to W. J. Barry, \$115,553; 1,512 ft. granite block pavement, 36 ft. wide, on Franklin St. and 970 ft. on Washington and Devonshire Sts., to J. D. Doherty, \$19,342 and \$18,418 respectively.

**\*Mich., Lansing**—Contracts for the construction of roads awarded as follows: Hall and Labby, Ironwood, for Road No. 35-6, Marquette Co., 3.257 mi. of road, 16

ft. in width, at \$79,927; Louis I. Goldberg, Traverse City, for Road No. 42-5-A, Grand Traverse Co., 2.058 mi., at \$6,714; Carl Bye, Traverse City, for Road No. 42-5-A-B Grand Traverse Co., B-gravel rd., 16 ft. in width, 3.010 mi., at \$24,375; J. Albert Swanson, Leroy, for Road No. 63-1, Lake County, B-gravel road, 16 ft. wide, 2.536 mi., at \$11,381; Holmes and Burridge, Crystal Falls, for Road 73-1, Iron Co., A-gravel rd., 16 feet in width, 1 mi., at \$5,955.

**\*Mich., Ann Harbor**—City will build sewers in Packard, State and Hill sts., Granger and Olivia aves., involving 7,170 ft. 12-27 in. vitr. pipe and 1,645 ft. 29-30 in. segmental block pipe. About \$35,000. Work will be done by day labor. Noted June 3.

Michigan State Trunk Line contracts awarded, week ending June 12, 1920. report No. 39.

Previously awarded since July 3, 1919, 538,468 length. Amount \$8,066,836.31; rd. 27-1, St. Clair Co., St. Clair City, Class F. Conc.; width 20 ft.; length, 1,527. Awarded to A. J. Smith Const. Co., Detroit, \$69,968.84; rd. 27-3, St. Clair Co.; Marine City; F-Conc.; width 20 ft.; length 2,255. Awarded to A. J. Smith Const. Co., Detroit, \$104,331.80; rd. 27-11; St. Clair Co., St. Clair Twp.; F-Conc.; width 18 ft.; length 1,700. Awarded to A. J. Smith Const. Co., Detroit, \$77,264.45; rd. 47-1, Shiawassee Co.; Rush Twp.; B-Gravel; width 16 ft.; length (2,596). Awarded to Wm. Clayton, Perry, \$23,622.56. Total, \$8,342,013.96.

Michigan Assessment District Contracts awarded, week ending June 12, 1920. Previously awarded since August 2, 1919: Length 374,891. Amount \$3,968,306.09. No awards made during week ending June 12, 1920.

Michigan Federal Aid Contracts awarded, week ending June 12, 1920. Previously awarded since September 29, 1917: Length 290,959. Amount \$4,872,513.52; rd. 41-A; Springfield-Groveland Twp.s; grading, drainage, structures; length, 5,230. Awarded to P. W. O'Connor & Co., Grand Rapids, \$61,150.83; 41-B; Oakland; Groveland-Holly Twp.; grading, drainage, structures; length 4,768. Awarded to Hill & Fuller, Big Rapids, \$38,002.88. Total, \$4,791,667.23. Frank F. Rogers, State Hwy. Commr. Lansing, Mich., June 14, 1920.

Michigan State Trunk Line Bridge contracts awarded, week ending June 12, 1920. Previously awarded since Jan. 1, 1920, 18 bridges. Amount \$132,973.42; state's share \$132,973.42. No awards made during week ending June 12, 1920.

Michigan State Grade Separation contracts awarded, week ending June 12, 1920. Previously awarded since July 1, 1919, 1 bridge. State's share \$19,460.00. No awards made during week ending June 12, 1920. Previously awarded since July 1, 1919, 26 bridges. Amount, \$488,366.81; state's share \$237,734.91. rd R-65; St. Clair County; Lynn Twp.; Mill Creek crossing, 50 ft., C.G. All bids rejected.

Michigan Federal Aid Bridge contracts awarded, week ending June 12, 1920; 2 bridges. State's share \$55,765.78. No awards made during week ending June 12, 1920. Frank F. Rogers, State Hwy. Commr. Lansing, Michigan, June 14, 1920.

**\*Minn., Elk River**—McCree, Moise & Co., of St. Paul, awarded contract for 8 miles of concrete pavement. Federal Aid Project No. 114, Sherburne Co., at \$2.97 per sq. yd.

**\*Minn., Detroit**—L. P. Graham, Frazee, Minn., awarded contract for the construction of Section B of Federal Aid Project No. 132, State Road No. 1. Work includes grading, ditching and graveling, at \$27,827.

**\*Minn., Redwood Falls**—Johnson & Drake, contractors, awarded contract for 36,224 sq. yds. of reinforced concrete st. pavement at \$3.75 a sq. yd.

**\*Miss., Magnolia**—Pike Co. Comrs. awarded contract to Bismark L. Bacot to work non-graveled highways in 4th road district.

**\*Mo., St. Louis**—Pope Constr. Co. of Jefferson Co. awarded contract for 12½ mi., at \$200,000.

**\*Mont., Helena**—C. E. Davidson only bidder for Project No. 94 for grading.

**\*Mont., Helena**—The Chinook Engr. & Constr. Co. was awarded contract for grading and graveling on 12.6 mi. of hwy., at \$118,060.

**\*Nev., Carson City**—J. Woods, 336 Mill St., Reno, Nev., awarded contract for 42 mi. of road south of Steamboat in Washoe Co., at \$4,166. John Ross, Yerington, Nev., low bidder for road, at \$22,850.

**\*N. J., Passaic**—W. P. McDonald Construction Co. and C. H. Earl awarded contract for 3 miles of pavement with granite blocks at \$426,535. M. J. O'Connell Constr. Co. awarded contract for rebuilding of Ridge Rd. to North Arlington and Lyndhurst at \$172,430. Geo. M. Brewster, for paving Williams Ave. in Hasbrouck Heights at \$2,780.

**\*N. J., Elizabeth**—Contract for paving north side of Westfield Ave. from Bayway to City Line with asphalt conc. awarded Standard Bitulithic Co. at \$75,642.

**\*N. J., Elizabeth**—Contract to construct a sewer in 6th Ave. from present terminus, distance of 230 ft., awarded T. Foster Callahan at \$1,159.45.

**\*N. J., Camden**—City let contract repaving various streets, to J. M. Kelly Contg. Co., 10th and Pearl Sts., \$39,849.

**\*N. J., Freehold**—Bd. Freeholders Monmouth Co. let contract building 12 mi. concrete road from here to Adelphi, Sect. 3, to Thompson & Glickman, Freehold, \$82,159. Noted May 20.

**N. Y., Brooklyn**—Bids received by Boro Pres. Connolly for improvement of Jackson Ave., Corona. Improvements contemplate paving street with asphalt and within trolley railroad area with improved granite blocks. The lowest bid was \$197,237 for Method A and \$200,477.50 for Method B.

**\*N. Y., Long Island City**—M. E. Connolly, pres. Queens Boro., let contracts building sewers in Alstyne Ave., to Savario & Britton, \$33,200; Carona Ave., to A. Paino, \$2016. East 14th St., Brooklyn, \$593,000; Wilbur Ave., also receiving basin in Wolsey Ave., to Kennedy & Smith, \$1,250 and \$1,730, respectively. Noted May 27.

**\*N. Y., St. George, S. I.**—C. D. Van Name, pres. Richmond Boro., let contract repaving Richmond, Vanderbilt and Herberton Aves., to J. E. Donovan, 2205 Richmond Terrace, Port Richmond, \$47,120, \$16,378 and \$12,104 respectively. Noted June 10.

**\*N. Y., Albany**—The following contrs. have been awarded by Fred'k S. Greene, state commr. of hwy.s, 55 Lancaster St., Albany, for repaving the following state hwy.s: \*Road No. 1271, Schuennemunk Constr. Co., Highland Mills, N. Y., \$170,583.35; \*Road No. 1272, Schuennemunk Constr. Co., Highland Mills, N. Y., \$150,423.50; \*Road No. 1270, H. J. Mullen Contracting Co., Jamaica, N. Y., \$182,407; Road No. 1275, H. J. Mullen Contrg. Co., Jamaica, N. Y., \$43,884.10; Road No. 1280, Willite Roads Constr. Co., Inc., N. Y. C., \$23,319.50; Road No. 1253, Harry W. Roberts & Co., Utica, N. Y., \$85,207.25; Road No. 1246, Harry W. Roberts & Co., Utica, N. Y., \$104,152.48; Road No. 1273, Arthur F. McConville, Ogdensburg, N. Y., \$75,236.80; Road No. 1257, L. D. Sullivan Co., Inc., Utica, N. Y., \$48,346; Road No. 1235, Lone Constr. Corp., McRiden, Conn., \$70,738.10; Road No. 1281, Holloran Bros., Elmira, N. Y., \$36,466.65; \*Road No. 1279, Nathan E. Young, Union, N. Y., \$41,618.40; Road No. 1276, John W. Gurnett, Watkins, N. Y., \$45,243.80; Road No. 1258, Lathrop, Shea & Henwood Co., Buffalo, N. Y., \$37,660.50. For Material Contr. No. 10, which calls for furnishing and delivering of lignin or sulphite liquor material, f.o.b. cars at destination, M. A. Terry, N. Y. C., \$16,404.50.

\*These will be awarded as soon as the counties make necessary deposit, which will be any day, and contrs. will then be awarded as indicated.

**\*N. Y., New York City**—White Plains Rd. Rapid Transit R. R., Transit Const. Com., John H. Delaney, commr., 49 Lafayette St., N. Y. C., let contr for track installations in various sts. Slattery Engr. & Constr. Co., 73 E. 42d St., N. Y. C.

\*N. C., Winston-Salem—Contract for constr. of about 2 1-2 mi. of hwy. connecting with Larkin Hwy. Awarded W. B. Smith, at about \$5,000 a mile.

\*Ohio, Hillsboro—Murdock Constr. Co. of Norwood has contract for paving of several sts., bitulithic paving on heavy concr. base is specified. Bonds have been sold and work begins next week.

\*Ohio, Canton—Contract awarded by the Bd. of Co. Comrs. of Stark Co. for paving 1.5 mi. road with monolithic brick to Harry Corl, Canton, at \$52,170.

\*Ohio, State—State Highway Dept., Columbus, let contracts building roads in the following counties:

Belmont Co., Sect. E, New Athens-Morristown Rd., 4.454 mi. grading, constructing bridges and culverts and paving with bituminous macadam, to R. J. Timmons & Sons, Cadiz, \$158,816.

Clermont Co., Sect. I, Cincinnati-West Union Rd., 2.524 mi. grading, constructing bridges and culverts and paving with macadam, to T. D. Van Camp, Hamilton, \$70,365.

Marion Co., Sect. G, Marion-Kenton Rd., 6.106 mi. grading, constructing bridges and culverts and paving with bituminous macadam, to Ludwig Stone Co., Marion, \$194,914.

Medina Co., Sect. H-1, Cleveland-Hinckley Rd., 1.49 mi. grading, cons. drainage structures and paving with reinforced conc. to G. S. Mellert-Weidner Co., Medina, \$70,898.

Wayne Co., Sect. F and G-1, Columbus-Wooster Rd., 3 mi. grading, constructing bridges and culverts and paving with concrete, to Johnson, Van Wagoner & Johnson, Tontogany, \$171,057.

Fulton Co., Sect. K-2, Archbold-Fayette Rd., 999 mi. grading, constructing drainage structures and paving with 2-course macadam, to C. M. Gray, Waterville, \$18,710.

\*Ohio, Cleveland—City let contract grading, draining, paving and curbing (a) Joan Ave. from West 105th St. to Lorain Ave., (b) East 124th St. from Woodland to Buckingham Aves., involving 31,885 sq. ft. 6 in. concrete base, 2,325 ft. stone curbing and tile gutter, to Cleveland Trinidad Paving Co., Superior Arcade, (a) \$19,476; Bentley Bros., Superior Arcade (b) \$6,133.

Ont., Welland—Welland Co. Council accepted the tenders of E. G. Law, 107 Hillsdale Ave., E. Toronto, to build two sections of road, one from Thorold to Black Horse, and one on the Garrison Rd. for 3 miles west from Ft. Erie. The price in each case is \$15,766 per mile. Other tenders received were: Thorold to Black Horse, David Walker, Niagara Falls, \$23,204; Garrison Rd., McCrae, Campaigne Thorold, \$13,825 per mile; McCrae, Campaigne & Cook, and Cook, Niagara Falls, \$23,204; Bowen Rd., Wm. Willick (9-ft. rd.), \$11,800.

\*Ore., The Dalles—The United Contr. Co. of Portland awarded contract for improving Bluff St. at \$27,605.

Pa., Allentown—Barber Asphalt Company low bidder for Amiesite paving at \$4.71 pper sq. yd. on Gordon St. between 6th and Jordan St., for setting stone curbing at \$0.50; constructing concrete curbing at \$1.25.

Pa., Harrisburg—State Hwy. Dept. opened bids for eleven road construction projects. The low bids follow: Bedford Co., Hopewell Twp., 20,870 ft.; Union Paving Co., Philadelphia, \$268,851.85. Beaver Co., Darlington Twp. and Darlington borough, 26,953 ft.; W. M. Keesecker and E. J. Kane, Youngstown, O., \$414,297.30. Cumberland Co., East Pennsboro Twp. and West Fairview borough, 18,268 ft.; Awixa Corporation, Islip, N. Y., \$244,983.47. Fayette Co., Perry Twp., 14,496 ft.; Petriello Bros. & Co., Brownsville, \$250,182.80. Jefferson and Clarion Cos., Union Twp. and Corsica borough, Jefferson Co. and Clarion Twp., Clarion Co., 39,261 ft.; Leo E. Kelly, Brooklyn, N. Y., \$509,842.78. Northumberland Co., Shamokin, Rockefeller and Upper Augusta Twp., 26,200 ft.; Sutton & Corson, Ocean City, N. J., \$326,035.20. Tioga-Lycoming Co., from Blossburg borough through Hamilton Twp., 72,004 ft.; Porter Bros., Mt. Pocomo, \$1,255,633.40. Pike Co., Matamoras borough, 3,549 ft.; H. B. Sproul Construction Co., Scranton, \$35,-

155.00. Union Co., Gregg Twp., near Allenwood, 5,960 ft.; T. L. Evans Sons, Danville, \$69,311.15. Venango Co., Sandy Creek and French Creek twps., 19,033 ft.; Martin Dolan, Jamestown, N. Y., \$209,992.92. Westmoreland Co., Derry Twp., 13,625 ft.; M. Bennett & Sons, Indiana, \$190,930.85. No bids were received for projects in North and South Union and Menallen twps. in Fayette Co., and one bid for work in Perry Twp., Fayette Co., rejected as no check accompanied it. There were no bids for East Mead Twp. work in Crawford Co.; East Wheatfield Twp. work in Indiana Co.; Orwigsburg borough job in Schuylkill Co.; Plum Twp. in Venango Co., and North and South Strabane Twp. project from Washington borough in Washington Co.

Pa., Harrisburg—The State Construction Company of New Kensington was the lower bidder for 50,025 feet of road work in Sandy Creek and Victory twps., Venango County, according to a tabulation of the bids received by the State Hwy. Dept. The bid was \$804,688.70.

\*Pa., Philadelphia—City let contract improving Ridge Ave. from Lamonte St. to county line, to Barber Asphalt Co., Land Title Co. About \$134,000.

\*Pa., Philadelphia—City let contract removing and laying water pipe in various streets, to McNichol Paving & Construction Co., 1923 Cherry St., \$23,750.

Pa., Harrisburg—State Highway Department officials today opened bids for eleven road construction projects. Eighteen projects had been advertised but no bids were received for six of them and on one job the bids were rejected because no check accompanied the proposal, as required by Departmental regulations. Only one bid was submitted for the work planned for West Fairview Borough. The bids were:

Bedford County, Hopewell Twp., Route 45, Section 3, 20,870 feet of either bituminous macadam surface course on a Telford foundation or one-course reinforced concrete; the surface of the roadway to be sixteen feet wide; Union Paving Co., Philadelphia, \$269,851.85.

Beaver County, Darlington Twp. and Darlington Bor., Route 204, 26,953 ft. of one-course reinforced concrete; roadway to be 18 3/4 and 38 feet wide; W. M. Keesecker and E. J. Kane, Youngstown, Ohio, \$414,297.30; The Chester General Contracting Co., East Liverpool, O., \$435,602.55; Samuel Gamble Co., Carnegie, Pa., \$440,750.35; J. C. Devine Co., Alliance, Ohio, \$437,540.20.

Crawford County, East Mead Twp., Route 89, 18,514 ft. of one-course reinforced concrete, 16 ft. wide; No bids received.

Cumberland County, East Pennsboro Twp. and West Fairview Bor., Applications 231-394. From the Northern Central Railway Bridge, in West Fairview Bor., to the East Pennsboro Twp. Line, thence to a point in Enola, and also from a point near Mann's Woods to a point near Sterrett's Gap Road, 18,269 ft. of one-course reinf. concrete, sixteen to twenty-four feet wide; Awixa Corp., Islip, N. Y., \$224,983.74.

Fayette County, North and South Union and Menallen Twps., Route 113, 15,080 feet of one-course reinforced concrete; No bids received.

Fayette County, Perry Twp., Route 247, in the vicinity of Star Junction, 14,496 ft. of one-course reinforced concrete and Hillside vitrified brick; Petriello Bros. & Co., Brownsville, Pa., \$250,182.80.

Fayette County, Perry Twp., Route 288, Section 1, near Perryopolis, 15,323 feet of one-course reinforced concrete and Hillside vitrified brick; roadway to be 16 feet wide; Petriello Bros. & Co., Brownsville, Pa., rejected (no check accompanied bid, as required by rules).

Indiana County, East Wheatfield Twp., Routes 223 and 314, 25,030 feet of one-course reinforced concrete and Hillside vitrified brick, 18 feet wide; No bids received.

Jefferson, Clarion Counties, Union Twp and Corsica Bor., Jefferson Co. and Clarion Twp., Clarion Co., Route 64, 39,261 feet of one-course reinforced concrete and Hillside vitrified brick; Leo E. Kelly, Brooklyn, N. Y., \$509,842.78; Red

Bank Construction Co., New Bethlehem, Pa., \$574,194.70.

Northumberland County, Shamokin, Rockefeller and Upper Augusta Twp., Route 161, 26,200 feet of one-course reinforced concrete, 18 ft. wide; Sutton & Corson, Ocean City, N. J., \$326,035.20.

Schuylkill County, Orwigsburg Bor., Route 141, 10,688 ft. of one-course reinforced concrete, bituminous surface course on a concrete foundation and vitrified brick; roadway to be eighteen to thirty-eight feet wide; No bids received.

Tioga-Lycoming Counties, From a pt. near Blossburg Bor. and Hamilton Twp. line to beginning of Route 21, 72,004 ft. of one-course reinforced concrete roadway, 18 ft. wide; Porter Bros., Mt. Pocomo, Pa., \$1,255,633.40.

Pike County, Matamoras Bor., Route 8, 3,549 ft. of either bituminous surface course on a concrete foundation or one-course reinforced concrete, 18 ft. wide; H. B. Sproul Construction Co., Scranton, Pa., \$35,155.00.

Union County, Gregg Twp., Route 176, 5,960 ft. of one-course reinforced concrete, 16 ft. wide (vicinity of Allenwood); T. L. Evans Sons, Danville, Pa., \$69,311.15; H. A. Moore Co., Inc., Milton, Pa., \$72,864.20; Fish, Young and Parks, Philadelphia, Pa., \$70,168.50.

Venango County, Plum Twp., Route 89, 3,419 ft. of one-course reinforced conc., 16 ft. wide; No bids received.

Venango County, Sandy Creek and French Creek Twps., Route 208, Section 1, 19,033 ft. of either bituminous macadam on a Telford base and Hillside vitrified brick or one-course reinforced concrete and Hillside vitrified brick, 16 ft. wide; State Construction Co., New Kensington, Pa., \$239,523.89; C. F. Hamilton, Inc., Franklin, Pa., \$223,643.40 (bituminous macadam); Martin Dolan, Jamestown, N. Y., \$209,992.92.

Washington County, North and South Strabane Twps., Route 181 from Washington Bor. line, a distance of about 22,845 feet, type of construction to be one-course reinforced concrete and Hillside vitrified brick, eighteen feet wide; No bids received.

Westmoreland County, Derry Twp., Application 965, 13,625 ft. of one-course reinforced concrete; McGrady Bros. Co., Braddock, Pa., \$206,121.25; M. Bennett & Sons, Indiana, Pa., \$190,930.85.

#### ROAD CONSTRUCTION

Beaver County, Darlington Twp. and a Telford foundation or one course reinforced concrete; Union Paving Co., 30th and Locust Sts., Phila., Pa., 1 course, \$268,851.85.

Crawford County, East Mead Twp., Route No. 89, Section No. 1, 18,514 ft. of one-course reinforced concrete; No bids received.

Cumberland County, East Pennsboro Twp. and W. Fairview Bor., applications Nos. 231 and 394, 18,268 feet of One-Course Reinforced Conc. Awixa Corporation, Islet, N. Y., \$224,983.74.

Fayette County, North Union, South Union and Menallen Twps., Route No. 113, Section No. 2, 15,080 feet of one-course reinforced concrete. No bids received.

Fayette County, Perry and Jefferson Twps., Route No. 247, Section No. 3, 14,496 feet of one-course reinforced conc. and Hillside vitrified brick. Petriello Bros. & Co., Brownsville, Pa., \$250,182.80.

Fayette County, Perry Twp., Route No. 288, Section No. 1, 15,323 feet of one-course reinf. conc. and Hillside vitrified brick. Petriello Bros. & Co., Brownsville, Pa., rejected. No check.

Indiana County, East Wheatfield Twp., Routes No. 223 and 314, 25,030 feet of



one-course reinf. concrete and Hillside vitrified brick. No bids received.

Jefferson and Clarion Counties, Union Twp. and Corsica Bor., Jefferson County, and Clarion Twp., Clarion County, Route No. 64, Sections Nos. 2, 3 and 4, 39,261 feet of one-course reinf. concrete and Hillside vitrified brick. Leo E. Kelly, 189 Montague St., Brooklyn, N. Y., \$509,842.78; Red Bank Const. Co., Inc., New Bethlehem, Pa., \$574,194.70.

Northumberland County, Shamokin, Rockefeller and Upper Augusta Twps., Route No. 161, Section No. 2, 26,200 feet of one-course reinf. concrete. Sutton & Corson Co., Ocean City, N. J., \$326,035.20.

Schuylkill County, Orwigsburg Bor., Route No. 141, 10,688 feet of one-course reinf. concrete bitum. surface course on a conc. foundation and vitrified brick. No bids received.

Tioga and Lycoming Counties, Hamilton, Bloss and Liberty Twps., and Liberty Bor., Tioga County, and Jackson Twp., Lycoming County, Route No. 21, Section No. 3, 72,004 feet of one-course reinf. conc. Porter Bros., Mt. Pocono, Pa., \$1,255,633.40.

Pike County, Matamoras Bor., Route No. 8, 3,549 feet of either bituminous surface course on a concrete foundation or one-course reinf. concrete. H. B. Sproul Cons. Co., Inc., 218 Adams Ave., Scranton, Pa. (Sheet Asphalt, Spec. "A"), \$35,155.00.

Union County, Gregg Twp., Route No. 176, Application No. 718, 5,960 feet of one-course reinf. concrete. T. L. Evans Sons, 344 Ferry St., Danville, Pa., \$69,311.15; H. A. Moore Co., Inc., 56 Bway, Milton, Pa., \$72,864.20; Fish, Young & Parks, 441 Hansbury St., Phila., Pa., \$70,168.50.

Venango County, Plum Twp., Route No. 89, Section No. 1, 3,419 feet of one-course reinf. concrete. No bids received.

Venango County, Sandy Creek and French Creek Twps., Route No. 208, Section No. 1, 19,033 feet of either bituminous macadam on a Telford base and Hillside vitrified brick or one-course reinf. brick. State Cons. Co., New Kensington, Pa. (1-course), \$239,523.89; C. F. Hamilton, Inc., 423 Franklin Trust Co. Bldg., Franklin, Pa. (Bit. Mac.), \$223,643.40; Martin Dolan, 35 Fairmount Ave., Jamestown, N. Y. (1-course), \$209,992.92.

Washington County, North Strabane and South Strabane Twps., Route No. 181, Section No. 1, 22,845 feet of one-course reinf. concrete and Hillside vitrified brick. No bids received.

Westmoreland County, Derry Twp., Application No. 965, 13,625 feet of one-course reinforced concrete. McCrady Bros. Co., 308 Sixth St., Braddock, Pa., \$206,121.25; M. Bennett & Sons, Indiana, Pa., \$190,930.85.

\*S. D., Aberdeen—Edmunds Co., state and Fed. Aid contracts awarded to Stevens Bros. Constr. Co. of Ipswich, for sum of \$121,059, contract including bridges, concrete culverts and grading work, Yellowstone trail.

Walworth Co., state and Fed. Aid contract awarded to Stevens Co. for building 9 mi. of the trail between Selby and Moberge, which is the west stretch of the highway and balance of which will be constructed by Walworth Co. Amount of money to be expended in that project is, according to the contract, \$75,157.

Corson Co., 9 miles of grading on the trail extending west from Moberge, awarded to Harvey Hawley of Trail City, for \$45,582.

Marshall and Roberts counties contract for grading totaling 24½ mi. of road, of which 19½ mi. is in Marshall Co. and five mi. in Roberts Co., awarded to Jalsing & Davis, of Britton, for sum of \$215,106. It will be a permanent road, however, which can be hard surfaced whenever the counties interested are ready to undertake that phase of the improvement.

Mr. Marwick said the following were projects for road building with the state and Federal Aid, which have been awarded in the state in the last four months:

In Hansen Co., 24 miles of road, to cost \$14,968.

Jackson Co., from Kadoka to White River, awarded to E. C. Pettijohn of Kadoka, for \$42,185.

Charles Mix Co., about 12 miles, to Arthur Loft of Yankton, for \$65,248.

Beadle Co., 13 miles from Huron to Cavour, including bridges and culverts, to W. I. Cole of Huron, for \$40,034. Graveling on this road awarded to Beadle Co., for \$47,055.

Turner Co., for grading and structures, a distance of 17½ miles, to W. R. Ship-ton Constr. Co. of Sioux City, Ia., for \$108,243. The bridges on that stretch of road will be built by the Federal Bridge Co., which has entered into contract for \$13,181.

Miner Co. a contract to grade and gravel road from Vilas east to co. line, via Howard, awarded to the W. R. Shipman Co. for the sum of \$108,581.

In Kingsbury Co. a contract has been awarded to the Shipton Co. to grade and gravel the road from Lake Preston east to the co. line, for \$91,302.

Minnehaha Co., contract for graveling road from Sioux Falls to Dell Rapids awarded to Minnehaha Co. for \$76,000.

Moody Co. a contract awarded to the county to build a road from Coleman west to co. line, to connect with the Fed. and State Aid project which was completed in Lake Co. last year. Contract for bridges on this road has been awarded to D. D. Bidwell of Vilas. Total amount involved in the contract is \$32,515.

State Aid hwy. projects involving an outlay of about \$40,000 also have been placed under contract in Haakon, Buffalo and Fall River counties.

There are now in force in the state, federal and state hwy. constr. projects involving a total expenditure of \$1,405,000.

Approximately, contracts involving expenditure of the same amount of money are to be awarded between this time and July 1.

\*Tex., Kingsville—Contract for improving Highway No. 12 in Kleberg Co. awarded to W. T. Montgomery, San Antonio.

\*Tex., Linden—Contract for 22.3 mi. of native iron ore gravel road 9 ft. wide, in Cass Co., awarded to Smith Bros., Crockett, and Healy Constr. Co., Dallas, at \$240,283.28.

\*Tex., Paris—Contract for road in Lamar Co. awarded to McElrath & Rogers, Corsicana, and Womack Constr. Co., Houston, at total of \$408,754.

All bids rejected for construction of 62.4 mi. road. Address W. M. Fooshee, co. engr.

\*Texas, Groesbeck—Limestone Co. let contract grading highways in Ben Hur Dist., to T. E. Ruby, Mart. About \$25,-

\*Texas, San Angelo—Tom Green Co. let contract grading, excavating and paving 0 mi. State Highways 9 and 9-A, 18 ft. wide, asphalt on concrete base, to Smith & Hicks, Hillsboro. About \$262,000; cost plus percentage basis. Work involves 25,000 cu. yd. earth and 420 cu. yd. rock excav., 31,060 cu. yd. crushed rock, 400 cu. yd. concrete in drainage structure, and 62,233 gal asphalt.

Utah, Provo—County Comrs. of Utah Co. opened bids for paving road between Provo and Pleasant Grove with 7-1-3 in. conc., 18 ft. wide, Gray and Murdock bid \$1.61 a sq. yd.; Wasatch Grading Co. bid \$1.94. The Gibbins-Reed bid for cement base with a bitulithic top was \$3.25 a sq. yd. and for black base and bitulithic top, \$3.65 a sq. yd. Gibbins-Reed bid for same piece of road with conc. base and bitulithic top, \$3 a sq. yd. The contracts will be awarded at a meeting of the county comrs. called for next Thursday. Heislett Construction Co. was awarded contract to build Provo canyon rd. from Wasatch Co. line south to Vivian Park.

Utah, Provo—Gray & Murdock were the only bidders on the 18-ft. paved rd. from Provo to Pleasant Grove. Their bid for this work was \$288,617.03, or an average cost of \$28,575.94 per mile for a seven and one-third inch concrete pav.

The second bid was on a strip of 10.1 miles between Provo and Pleasant Grove nine ft. wide, to be built of seven and one-third inch concrete, at a total cost of \$159,077.13, average of \$15,750.21 per mile.

Third bid was on an 18-ft. road from Provo to a point 2.4 miles west and no. from Provo. This road is to be built of seven and one-third inch concrete. Three bids were submitted on this piece

of paving as follows: Gray & Murdock, \$64,771.70, or an average of \$26,988.21 per mile; Wasatch Grading company, 74,775, or an average of \$31,156.25 per mile; Strange & McGuire bid \$87,243.80, or an average of \$36,351.50 per mile.

Fourth bid was on a three-mile strip of road 18 feet wide of seven and one-third inch concrete, from Pleasant Grove extending this direction. The bids are as follows: Gray & Murdock, \$86,194.14, or an average of \$28,673.14 per mile; Gibbons & Reeds, \$123,719.94, or an average of \$41,239.98 per mile.

\*Vt., Winooski—Contract for curbs, gutters and sidewalks awarded to Peter Sheeran Concrete Co., Burlington.

\*Va., Richmond—Bd. Pub. Wks. let contract paving (a) Broad St. from Blvd. to Roseneath Rd., involving (1) 2,000 cu. yd. excav., (2) 5,800 sq. yd. asphaltic concrete.

\*Washington—State Highway Comm., Olympia, let contract clearing, grading and draining 3.6 mi. Olympic Highway from Montesano to Brady, Grays Harbor Co. to Beck & Einerson, Hoquiam, \$50,391; clearing, grading, draining and surfacing with gravel 2 mi. State Rd.; 4 from Tonasket east, to F. L. Anderson, Malott, \$32,664, and grading and graveling, 4.14 mi. Chelan and Okanogan Highway, Okanogan Co., to J. C. Buedett, Malott, \$25,268. Noted May 20.

\*Wash., Goldendale—Clickitat Co. let contract grading, draining, graveling, surfacing with crushed rock and eliminating all grades exceeding 8 per cent on 8 1-2 mi. White Salmon-Snowden Highway, to W. Leidl, Greenwood, \$98,162.

\*Wash., Montesano—Grays Harbor Co. let contract grading and graveling 2 1-2 mi. North River Highway, to J. J. Coyne, Port Townsend, Wash. About \$58,000.

\*Wash., Port Angeles—Contract for paving with conc. on first Street from Lincoln to Valley St. Awarded P. J. Woods & Co. at \$77,000.

\*Wash., Seattle—Standard Asphalt Paving Co., Seaboard bldg., awarded contract for building 22 mi. of the north and south highway in Latah co., Idaho, for \$291,457.

\*Wash., Spokane—Stems & Carlson, Spokane contractors with offices in the Realty bldg., awarded contract to build 30 miles of highway between Coram and Spotted Bear, Mont.

Wash., Seattle—Bids opened by Bd. of Public Wks., Fifth Ave. N. E.—L. I. D. 3305 by paving: R. G. Stevenson, \$13,186.50; F. N. Badolato, \$14,295.00; Jahn v Bressi, \$14,309.25; J. L. Smith, \$15,000; Colaccio & Erickson, \$16,365; F. Agostino, \$17,070.25. 40th Ave. N. et al. L. I. D. 3306 by sewers: V. Ramaglia & Co., \$55,247; Agostino Bros., \$58,636.30; F. N. Badolato, \$61,155; Coluccio & Erickson, \$68,589.75.

\*Wash., Seattle—Contracts awarded: Forty-first Ave. N. et al.—L. I. D. 3277, Ord. 40712 by grading, concrete walks, etc., awarded to Scalzo & Co., on bid of \$125,270.50. West Garfield St. et al. Ord. 40619, L. I. D. 3272, by paving, etc., awarded to Coluccio & Erickson, \$20,259.75.

\*W. Va., Charleston—Contract for masonry and road grading on Elk River has been awarded by county court to Brown & Floyd, price being \$71,527.80. Contract provides for grading of 1.94 mi. of road, which will carry highway to Cooper's creek.

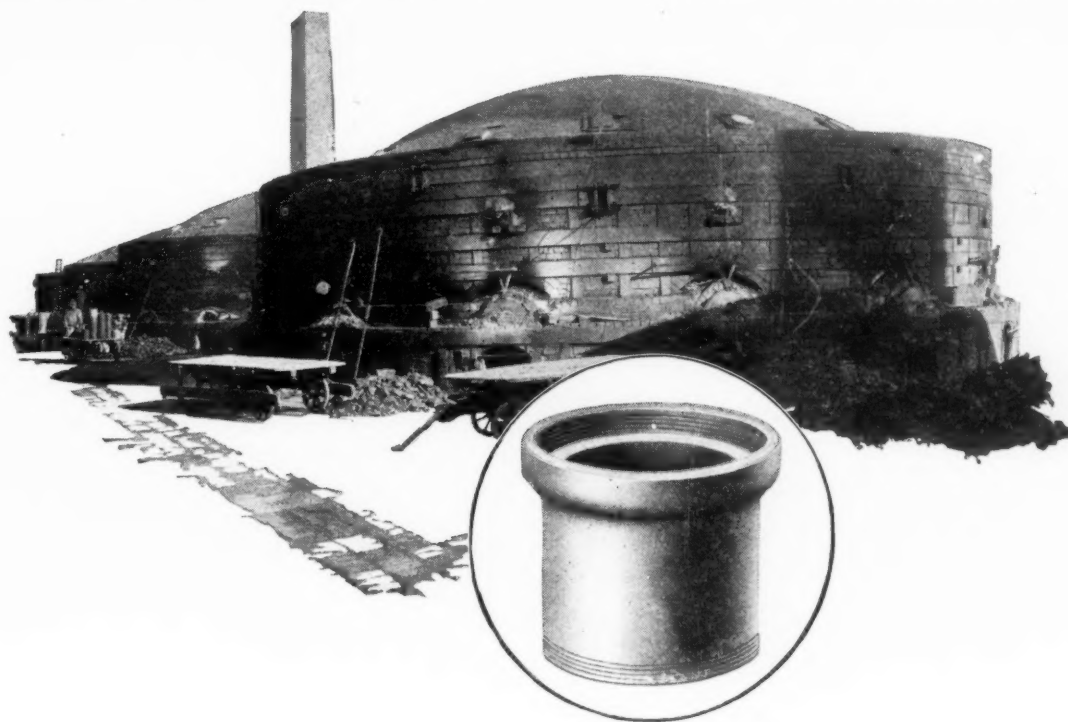
\*W. Va., Logan—Logan Co. let contract building Monitor Junction-Monaville Dd. to P. Minotti, Logan, \$62,664.

\*Wis., Green Bay—Contracts, aggregating \$194,255, for pavements which city proposes to build this year, awarded by the city comrs. to F. P. Caughlin Co. of Chicago.

\*Wis., Grand Rapids—Wood Co. State Rd. and Bridge Committee let contract for Culvert work on Progress-Pittsville and Pittsville-Neillsville road to E. Stein, Pittsville, 92.4 cu. yds. concrete at \$19.50, \$1,801.80.

\*Wis., Monroe—Green Co. State Road and Bridge Committee let contract for the Twin Grove Rd., town of Jefferson, to J. L. Burch, Monroe, Wis. Est. quantities: 5,718 cu. yds. grading at \$0.95, \$5,431.10.





## THE ENDURANCE OF VITRIFIED CLAY SEWER PIPE

Once laid, Vitrified Clay Sewer Pipe is certain to endure despite the hordes of corrosive acids, alkalis, gases or wayward electric currents that may lay siege upon it, immediately, in ten years, or ever. For it is a standard factory product, super-tested for certainty by an infallible inspector—Fire in the kilns.

Laws to forbid the discharge of fluids bearing acids, alkalis and other agents of disintegration, ordinances to stem the mischievous roving of electricity underground, are superfluous with Vitrified Clay Sewer Pipe.

Stern laws than man's protect it. It

is Nature's immutable decree that Vitrified Clay shall forever endure. Nature stands sentry against her forces of destruction.

The lasting certainty of Vitrified Clay Sewer Pipe guards sanitation for all time. Who can foretell the coming industrial alterations within a rising community? Who can forecast the destructive agents that may appear in the wastes of enterprises yet unborn?

Lay to stay with Vitrified Clay. Protect, with certainty, this generation and the generations to come.

CLAY PRODUCTS ASSOCIATION  
PITTSBURGH CHICAGO

## VITRIFIED CLAY

*Sanitary Sewer Pipe*



## SEWERAGE AND SANITATION

**Ala., Troy**—City ordinance introduced providing for construction of sanitary sewer on North Three Notch St. The mayor.

**Fla., West Palm Beach**—City voted \$100,000 bonds for constructing sewers and drains. Mayor Dunkle.

**Ga., Cedartown**—City contemplates issuing bonds for sewerage and drainage. H. M. Hall, mayor.

**Ind., Indianapolis**—Resolution adopted for local sewer in first alley west of Senate Ave.

**Ind., Mt. Vernon**—City Council is considering building new sewer system in extreme western part of city. Plans are for combination sanitary and surface sewer that will have capacity large enough to handle sewer question for this section of city for many years to come. Estimate of cost of sewer is between \$12,000 and \$15,000.

**Ind., Indianapolis**—Local sewer in 1st alley west of Senate from Ray St. to second alley north of Wilkins.

**Ill., Bellevue**—M. V. Norris, of Webster City, has been in Bellevue making survey of city for proposed new sewerage system. Mr. Norris is vice-president of Currie Engr. Co., Webster City.

**Iowa, Fort Madison**—Contract for a half-million dollar sewer system awarded National Const. Co., of Davenport. Contract calls for laying 26 mi. of main and lateral sewers composed of both eight and 24-inch pipe. Two separate ejector plants will be erected at each end of city to pump sewage into river. In addition contract provides for overhauling and repairing present sewer system.

**Iowa, Des Moines**—City Council adopted a resolution to provide a sanitary sewer in Hickman ave. to Center of Franklin Ave. A. E. McGlothlen, city clk.

**Man., Brandon**—This city considers the erection of an incinerator at a cost of about \$1,500.

**Mich., Charlotte**—City Council plans the extension and construction of sewers at \$10,000.

**Mich., Ironwood**—Construction of the \$43,000 sewer project has been started here. More than three miles of sewer will be laid. With the completion of the project Monticello location, for the first time in 30 years, will have sewer facilities.

**Mich., Monroe**—Bonds have been voted for new sewers in various parts of the city to cost \$250,000. Engr., L. A. Sturn, City Hall.

**Mo., Kansas City**—City to repair all bad sewers. All flush tanks not needed will be eliminated. Pearly saving of \$150,000 expected by discontinuing broken equipment now wasting 6 million gallons of water daily.

**N. Y., Brooklyn**—Authorized by Bd. of Comrs.: Sewers in easterly side of Ocean Parkway. Sewers in Van Dam St., east side, and in Young St.; estimated cost, \$12,500. Storm water sewer in Borden Ave., and combined sewers in Orton St., from Hunterspoint Ave.; in Borden Ave., in Starr Ave., in Young St. and in Borden Ave., sQueens; estimated cost, \$60,000. Sewers in Ferguson St., in Roosevelt Ave., in Gunther St., in Havemeyer St., in Kingsland Ave., in N. Railroad Ave., in S. Railroad Ave., in Lurting St., in Nicolls St., in Opdyke St., in Provoost St., in Radcliff St. and in Tiemann Ave.; estimated cost \$127,500.

**N. Y., Syracuse**—Ordinance passed providing for constr. of \$57,000 worth of sewers in the Twin Hill district.

**N. C., Belhaven**—Bids will be readvertised to D. S. Smith, town clk., for building a sewer system. Carolina Engr. Co., engrs., 412 Southern Bldg., Wilmington, N. C.

**Ohio, Canton**—City Council passed ordinance providing for construction of a sanitary sewer in Anderson Pl., S. W.,

enties Slip and East River Pier 6, and from Harrison Ave., S. W. to end of Anderson Pl., S. W.

**Ohio, Canton**—Council committee on sewage has recommended extensions and enlargements of plant at Howenstein that will double capacity of plant. City Engr. Sarver will present report to council.

**Ohio, London**—Legislation for sewerage of East High Washington and First Sts. has passed council under emergency legislation.

**Pa., Harrisburg**—Surveyors will be employed to draw up plans and specifications to be submitted for bids for conc. sewer across Swatara St.

**S. C., Florence**—City probably will vote on issuance of \$100,000 of bonds for sewer extensions and waterworks extensions. The mayor.

**S. D., Sioux Falls**—City Auditor will advertise for bids for constructing sewer on 26th St. from Minnesota to Spring, and on Spring from 5th St. to 26th St., and on 26th St. from Summit to Prairie, and on Prairie from 24th to a point 147 feet south of 27th St.

**Utah, Salt Lake City**—Bd. of Comms. passed resolution of intention to provide for constr. and laying of sewer lateral of first class vitrified pipe 8 inches in diameter on west side of N. St., between 6th and 7th Aves. Estimated cost about \$1,876.50. W. A. Leatham, city rec.

**Va., Charlottesville**—Charlottesville voted on authorizing a million dollars worth of bonds for water, sewer, gas and other improvements.

**W. Va., Wheeling**—Plans have been completed by City Engineer Charles Conrad for the construction of the sewerage system in Pleasanton.

## BIDS RECEIVED AND CONTRACTS AWARDED

(\* Indicates Contracts Awarded)

**Iowa, Ft. Madison**—National Constr. Co. of Davenport low bidder for sewer job for Ft. Madison. Contract provides for laying 26 mi. of sewers, erection of pumping and ejector plants and overhauling present system. National Construction Co. and four other firms entered bids. Davenport concern low, bid being \$487,247.93.

**\*Minn., Duluth**—Johnson & Korhonen awarded contract for sewer in Hured St., at \$25,208. Peterson Bros., for sanitary sewer in 57 Avenue West, at \$2,435. Johnson, Nordgren & Storie awarded contract for sanitary sewer in 6th St., at \$1,126; also sanitary sewer in Greysolon Alley at \$1,666.

**\*Minn., St. Paul**—Christ Johnson, 506 Harrison Ave., St. Paul, awarded contract for constructing sewer on Thorn St., at \$2,393.

**\*Mo., Kansas City**—W. D. Doyle Construction Co., Railway Exchange Bldg., awarded contract for constructing sewer in Sewer Dist. No. 169, in Sewer Division No. 3, for \$3,204.

**\*N. Y., Scarsdale**—Frank Bracalello, Scarsdale, N. Y., awarded contract for the following: 5,000 feet of 8-inch sewerage extension, 20 manholes, 5 flush tanks, 2,000 cu. yds. of rock excavation for the total of \$30,313.

**\*N. Y., New York City**—H. H. Curran, pres. Manhattan Boro., let contract repairing barrel sewers (1) at foot of Co-at foot of Jefferson St. and East River (New Pier 46), (2) at foot of 21st St. and East River and foot of 29th and 33rd Sts., East River, to Melrose Constr. Co., 103 East 125th St., (1) \$16,510 and (2) \$11,515.

**N. Y., Brooklyn**—Bids received for construction of two sewers in Flushing section and one in Long Island City. Contracts and lowest bids on each were: Custer (15th) St. and in Beech Ave., Flushing, \$1,718.78; Lawson Pl. (24th), Flushing, \$7,130.69; sewer in 16th Ave., Long Island City, \$3,130.01.

**Ohio, Cleveland**—City let contract building sewer in Othello Ave. from East 136th St. to East 140th St., to A. Marra, Illuminating Bldg., cost \$16,342; Superior Ave. from East 21st to East 22nd Sts., to Iafornaro Co., 3218 Murray Hill Rd., \$9,636; Carnegie Ave. from East 22nd to

East 40th Sts., to Manson Co., 343 The Arcade, \$80,790. Noted June 10.

**\*Ohio, Cleveland**—City let contract laying sewer in Darwin Ave. from East 140th to East 146th Sts., to A. Marra, Illuminating Bldg., \$9,107; East 129th St. from Iroquois Ave. to city limits, to G. Assad, 251 Bradley Court, \$6,350; Orleans Ave. from city limits to East 103rd St., to G. Assad, 251 Bradley Court, \$2,707; Scoville Ave. from East 36th to East 55th Sts., to Gallagher-Burke Constr. Co., 1339 Irene Ave., \$79,516. Noted May 20.

**\*Ont., Toronto**—Messrs. P. H. Secord & Sons, of Brantford, Ont., awarded contract for building a 20-story addition to the King Edward Hotel at \$2,500,000.

**\*Ont., Leamington**—Town Council let contracts to F. Smithson for sewers on Chestnut and Fox Sts.

**\*Ont., Owen Sound**—Contract for storm sewer on Second Ave. East, awarded Carran & Briggs, Ltd., at \$3.30 per ft. for excavation and \$147 each for manholes, city supplying pipe, brick and castings.

**\*Pa., Philadelphia**—Contracts for branch sewers awarded contracts as follows: William H. Crossen for sewer in Buckrell St., Joseph Venuto, for sewers in 65th St., at \$31,500, and Joseph Perma for sewers in 66th St., at \$24,000.

**\*Pa., Harrisburg**—Stucker Bros. Construction Company awarded contract for a sewer to be rebuilt in Cumberland St., at \$39,350.

## WATER SUPPLY

**B. C., Vancouver**—Nearly \$30,000,000 will be spent according to preliminary estimates for development of the huge Bridge River power project near Lillooet, work on which has been commenced by engineers who will work out details of possible construction immediately.

Present plans call for a tunnel a mile and a half long under Mission mountain discharging into Seaton lake, six miles from Lillooet. The fall will be 1,400 ft. and an estimated horse power of 400,000 will be developed.

With the exception of Niagara Falls and Victoria Falls, on the Zambezi river, Africa, this will be the biggest power site in the world.

**Cal., Martinez**—Board of Trustees contemplates improvements to water system in this town.

**Ga., Crawford**—City will vote July 2 on issuance of \$50,000 of bonds for installing waterworks and sewerage system. Mayor Blanchard.

**Mich., Mt. Clemens**—A preliminary survey is being made for the water supply system for this city at an estimated cost of \$200,000.

**Mich., Detroit**—Immediate improvements to Windsor water works, including laying of booster mains, will be made. City Council gave third reading to by-law authorizing expenditure of \$150,000 for this purpose.

**Mich., Ironwood**—City has disposed of \$275,000 water works bonds.

**Mo., Savannah**—A recent election resulted in favor of issuing water works improvement bonds to the amount of \$15,000.

**Mo., Fayette**—City Council of city of Fayette have retained Johnson & Benham, consulting engrs., Firestone Bldg., Kansas City, Mo., to draw up plans and specifications for water works improvements, consisting of a dam and supply line. Funds are available for this work and it is expected that a contract for the construction work will be let some time within the next 90 days.

**Mont., Helena**—Helena's proposed water bond issue which was voted upon favorably at the city election was held valid.

**N. J., Rahway**—Middlesex Water Co., Madison Hill Rd., has been ordered by Pub. Utility Comm. to install equipment at plant which will provide for 4,000,000 gal. water daily.

**N. J., Atlantic City**—Water Dept. will advertise for bids for -ton truck chassis.

**N. Y., Voorheesville**—Bd. of Trustees of village passed resolution to sell to highest bidder water works bonds to amount of \$5,000 to provide additional water supply for village. S. J. Daring, village clerk.

**N. Y., N. Y. City**—Colombian Bureau of Information J. A. Gonzalez, vice chn., 120 West 42d St., will be interested in catalogues of water meters for buildings.

**Ohio, Cincinnati**—Fred Schneller, clk. of the council states a bond issue of \$400,000 is about to be sold, proceeds for which are for enlarging of the waterworks plant and for extensions of the service.

**Ohio, Dennison**—City Engr. has presented plans for drainage of surface water on 2nd and 1st Sts., cost of which will be \$13,000.

**Ohio, Gibsonburg**—Village Clerk La Rue Carr will receive sealed bids until June 28 for 5½ per cent, semi-annual, 5¼-year (average) water main extension bonds to the amount of \$3,000.

**Ohio, Greenfield**—An election will be held Aug. 10 to vote the issuance of water works bonds to the amount of \$135,000. This issue was defeated at an election on April 27.

**Ohio, Niles**—Another bond issue will soon be proposed to pay for necessary pipe in connection with improvements at water works plant.

**Ohio, Cleveland**—Engr. Frazier Ellms Sheal Co. Illuminating Bldg., are preparing plans for the water works development for the city of Bay City, Mich. Estimated cost, \$2,000,000.

**Ohio, Norwalk**—Greenwich plans to contest State Health dept. mandate commanding village to establish a filtration plant.

**Ohio, Columbus**—An ordinance has been introduced in the council authorizing the employment of an electrical engineer at the municipal electric light plant.

**Ohio, Columbus**—Council has engaged the firm of Esselstym, Murphy and Hanford of Detroit to conduct a survey of the municipal light plant with view of determining what improvements are required.

**Okla., Purcell**—City retained Johnson & Benham, engrs. Firestone Bldg., Kansas City, Mo., to prepare plans for waterworks system and extensions to main sanitary sewerage system.

**Ont., London**—According to a statement given out by General Manager E. V. Buchanan, of the Utilities Commission, a pipe line to supply the cities of London and St. Thomas with water from Lake Erie would cost between \$2,500,000 and \$3,000,000. Proposal to have cities join in the enterprise is being pushed. Mr. Buchanan further estimates that cost of operation of two-pressure-raising plants would be about \$500,000 per annum.

**Ont., Stratford**—A by-law authorizing the construction of water mains on Chestnut and Nelson Sts. was passed by the City Council. Total estimated cost, \$3,563.20. City engr., A. B. Manson.

**Ont., Stamford Twp.**—Three schemes are being considered for a water works system for the south end of the township. Estimated cost, \$125,000. Clerk, C. F. Monroe, Niagara Falls, Ont.

**Ont., St. Thomas**—City Engr. W. C. Miller, and County Engr. James Bell have submitted estimates and plans for pumping of water from Port Stanley for the auxiliary use of this city. Total estimated cost at \$382,800.

**Ore., Burns**—City retained L. C. Keissey, consult. engr. Portland and Nampa, Idaho, to prepare plans for waterworks system.

**Pa., Pittsburgh**—City Council passed ordinance providing for improving of water supply of the former Spring Gar-

den Borough recently annexed to the city, at cost of \$30,000.

**Que., St. Lambert**—Town plans to expend \$68,600 for extension and improvements to waterworks system, also \$22,700 for new sewers.

**S. C., Florence**—City probably will vote on issuance of \$100,000 of bonds for water works improvements and sewer extensions.

**S. D., Redfield**—The addition of a 250,000-gallon concrete reservoir and two pumps which will each pump 250 gallons of water a minute are the largest improvements contemplated to city water system under recommendations which have finally arrived at by city engineer and water committee. Original plans for water system improvements included the erection of a standpipe and other expensive improvements; difficulty in marketing bonds has restricted the work. Additions to the water mains systems are also planned for this summer's program. Extensions of the high-pressure mains are included.

**Texas, Galveston**—City having plans prepared building steel or concrete reservoir, with 1,750,000 gal. capacity. About \$150,000. C. Wittig, city engr.

**Tex., Houston**—An appropriation of \$25,000 has been made for the extension of city water system.

**Utah, Ogden**—Citizens will be asked to vote a bond issue to provide for enlargement of city's water supply and installation of a municipal lighting system.

**Va., Winchester**—City Council passed ordinances calling for an election in July to vote on a bond issue of \$100,000 for the construction of two additional reservoirs and other waterworks improvements and an additional \$75,000 bond issue for street improvement.

**Wash., Fairfield**—A resolution to lay in access of 2,000 feet of water mains and connections was passed recently by the city council.

#### BIDS RECEIVED AND CONTRACTS AWARDED

(\*Indicate Contracts Awarded)

\***Ill., Ladd**—A. B. Bell, of St. Charles, Ill., awarded contract for sinking artesian well, at \$3,000.

\***Ill., Decatur**—City Council let contract building, impounding dam, to L. N. Cope & Son, 116 Merchant St. About \$1,000,000.

\***La., Shreveport**—City let contract building 3,000,000 gal. concrete covered water basin, etc., to R. A. Gibson, Shreveport, \$117,250.

\***Minn., Hibbing**—C. H. Oliver, local contractor, awarded contract to lay water mains in North Virginia. Also been awarded contract for clearing school land near Little Swan.

\***N. J., Perth Amboy**—Hardiman & Larsen, of this city, only bidders for the laying of 2,000 feet of 6-inch pipe in Laure and Neville Sts., at \$1.25 per ft.

\***Ohio, Lima**—Directors of Bell Center Light & Power Co. have made a contract with the Wentworth Const. Co. of this city for constr. of a high tension wire from Huntsville to Belle Center line will be in use by August 1.

\***Okla., Tulsa**—M. C. Marshall, local contractor, awarded contract for putting in the foundations for the new 12,000,000-gallon horizontal cross compound Corliss pump.

\***Ont., Chatham**—The Canadian Des Moines Steel Co., Ltd., of this city, have been awarded the contract for the three new pressure filters to be added to the present water works plant. The price of the filters is \$13,479. The following tenders were also received: New York Continental Jewell Filtration Co., \$18,825; Norwood Engr. Co., \$16,800; the Roberts Filter Manufacturing Co., Inc., \$17,000, and the John ver Mehr Engr. Co., Ltd., \$18,160. The valves will be made by the Kerr Engine Co., Ltd., Walker-ville.

#### LIGHTING AND POWER

**Cal., Redding**—Supervisors have granted F. M. Archer of San Francisco a petition for a new townsite, called Soldier Mountain, near Fall River Mills.

According to the petition, the townsite will take in several acres of land and is said to be backed by the Pacific Gas and Electric Company.

Company is planning to build one of their larger power plants at the point.

**Cal., San Francisco**—Authority to issue and sell \$1,500,000 in stock in order that it might complete its Caribou hydro-electric project on the Feather River was granted the Great Western Power Co by State Railroad Commission.

The plant at first estimated at \$4,321,000 will cost \$6,246,000 when completed.

**Cal., Sacramento**—City Manager Edwin J. Fort was authorized by City Council to purchase an acetylene gas outfit to keep a light in operation steady; cost plus 10 per cent percentage basis.

**Cal., Oroville**—Work will begin at once for improvements to gas system. Willis Yard, gas engineer for the Pacific Gas & Electric Co.

**Ca., Eastman**—City authorities of Eastman are considering the construction of a municipal light and power plant.

**Ca., Rome**—A survey is to be made for a transmission line that will connect the Alabama Power Co. and the Georgia Railway and Power Co. The line will extend from Gadsden to Lindale, a distance of 52 miles. Work will cost between \$200,000 and \$300,000.

**Kan., El Dorado**—The Empire Gas & Fuel Co. will rebuild dam on Fall River in Greenwood County.

**Md., Baltimore**—Lighting Supt. Hanson ordered the installation of a number of 400-candle power electric lamps at Charles St. Ave.

**Minn., Norcross**—At a recent election an issue of electric light bonds to the amount of \$6,000 was voted upon.

**N. J., Newark**—The Hospital at Soho considers the erection of a hospital power house to cost \$20,000.

**N. Y., Albany**—The Walkhill Valley Electric Light & Power Co. have been granted permission by the New York State Public Service Commission to construct an extension to its electric plant in the towns of Montgomery and Walkhill, Orange County, N. Y., and to issue stock and bonds.

**N. Y., Albany**—The New York State Public Service Comm. granted the petition of R. L. Brown and G. R. Beckwith permission to construct an electric plant in the towns of Taylor and Cincinnatus, Cortland County, N. Y.

**N. Y., Albany**—The New York State Public Service Commission authorized Frank E. Everest, Wilmington, Essex Co., N. Y., to construct an electric plant for furnishing the public with electricity in the town of Wilmington, Essex County, N. Y.

**Ohio, Hamilton**—Construction of electric light plant and water works contemplated, cost about \$650,000.

**Ohio, Minerva**—Village Clerk Harvey Glass will receive sealed bids until June 30 at noon, for 6 per cent, A. & O., 14-year (average) electric light work coupon bonds to the amount of \$50,000.

**Pa., Harrisburg**—City Council passed an ordinance providing for 75 new street lights, ten arcs and the balance incandescents.

**Va., Hampton Roads**—Plans being drawn for electric underground district system, cost about \$38,000.

#### BIDS RECEIVED AND CONTRACTS AWARDED

(\*Indicates Contracts Awarded)

\***Ind., Richmond**—Contract for a coal-handling and reclaiming machinery at City Electric Light & Power plant awarded R. H. Beaumont Co. of Philadelphia for \$43,000.



## FIRE

**Ind., Lafayette**—Village of Judysville, which is largely owned by a private citizen, John F. Judy, has been damaged by fire to extent of \$100,000. A fire-fighting brigade was organized to meet the situation and some more modern form of fire protection will now be likely.

**Mass., Millbury**—City has been authorized to borrow \$12,000 for purpose of buying new fire truck at the Bermanville fire station.

**Mass., Springfield**—Thomas Hickey, moderator of the town of North Hadley, states a report has been made by the fire committee on the problem of fire protection which will involve an outlay of several thousand dollars. The report goes to council of village at next meeting for action.

**Mich., Jackson**—Town of Springport has been visited by a disastrous conflagration and a volunteer body of fire-fighters organized to meet the situation. The town is near Albion and the fire has brought to the villagers the importance of some form of fire protection.

**Miss., Gulfport**—Sealed bids will be received till July 8 for purchase of fire apparatus bonds to amount of \$15,000.

**Miss., Corinth**—Sealed bids will be received till July 1 for purchase of fire apparatus bonds to amount of \$9,000.

**Neb., Omaha**—Installation of modern police and fire alarm system, discussed at conference of City Comrs., City Electrician Israel Lovett. It is estimated municipal system would cost \$250,000.

**N. Y., New York City**—Fire Commissioner has asked for an appropriation of \$225,000 to cover cost of a new fire boat.

**Ohio, Dayton**—City plans to build new signal system for Fire Dept., also brick and concrete house for central station and equipment. Abot \$180,000. G. Baker, city engr.

**Ohio, Dayton**—Ordinance providing for sale of fire apparatus bonds of \$263,700 placed on first reading by city commission.

**Ohio, Eaton**—Bonds aggregating \$27,500 will be sold by the council of village of West Alevandria, July 6, for providing funds for building of town hall and community building and purchase of fire fighting apparatus.

**Ohio, Hillsboro**—Bonds for proposed fire truck have not been sold and bids on the fire truck will not be considered until a sale of the bonds is effected. They will be offered at private sale at once. The American La France Co. has offered to sell the truck the city requires at the old price, despite an advance of nearly \$1,000 in the price of the machine.

**Ohio, Middletown**—City Comn. has purchased four lots on Michigan boulevard and S. Baltimore st. as a site for a third fire station. Plans will be prepared for a fire station to protect the newly annexed southern section of city. Improved equipment, as recommended by Acting Chief Elmer F. Reed, will also be installed.

**Wis., Madison**—Fire Chief Thomas A. Clancy has recommended the motorization of the 20 companies, now horse drawn, which plan if adopted, he says, will mean an annual saving of \$64,000 per annum. Two platoon system in the fire dept. is about to be introduced.

## BIDS RECEIVED AND CONTRACTS AWARDED

(\* Indicates Contracts Awarded)

\***Ohio, Cincinnati**—Architects Steinkamp & Bros. Mercantile Library Building have plans for fire engine house to be erected at St. Bernard, and have awarded the general contract to G. E. Hamby, 2604 Harris ave. The structure will be two stories and basement, 62 by 76, and will cost \$65,000.

## BRIDGES

**Cal., Nevada City**—Bd. of Supervisors have approved plans and estimates submitted by State Highway Comm. for new conc. bridge across Middle Yuba River, above Freeman's Crossing, on Nevada City-Downieville lateral. Highway Comm. has been authorized to proceed with construction of bridge.

**Cal., Fresno**—New bids will be received for 25 bridges and culverts on Whites Bridge Ave. Plans being revised. Address Co. Engr. of Fresno Co.

**Cal., Placeville**—Bd. of Supervisors has ordered new bridge constructed across Webber Creek, on Big Cut Rd.

**Del., Wilmington**—Luten Bridge Co., York, Pa., will probably be awarded contract for concrete bridge to be constructed over Drawyers Creek on road from Odessa to Armstrong Corners in St. Georges Hundred, at \$5,065.

**Fla., Jacksonville**—New plans being prepared for Lee St. Viaduct; estimate, \$18,000. Address City Engr.

**Ill., East Peoria**—Construction of bridges planned, estimate \$40,000. Address City Clk.

**Iowa, Burlington**—Iowa rd. comm. has forwarded to bd. of supervisors plans and specifications for bridges and culverts on piece of fed. aid paving on Blue Grass route.

**Kan., Kansas City**—Reinforced conc. bridge planned over Kaw River at 12th St. Address Co. Clk. of Wyandotte Co.

**Ohio, Dover**—Plans and specifications for repair of Wooster Ave. bridge filed with notice of intention to repair and repave with conc. block. Co. Aud., J. T. Baker will advertise at once.

**Mich., Detroit**—Plans are being prepared by Strauss Bascule Bridge Co. for the renewal of that company's railway bridge over the short cut canal, Detroit, Mich.

**Minn., Grand Rapids**—County Auditor will advertise for bids for the filling in of approaches to Swan Lake Bridge, located in Section 36.

**Neb., Plattsmouth**—Cass Co. Comrs. endeavor to obtain definite action from state toward erection of bridge over Platte River at this point.

**Neb., O'Neill**—A 300-ft. state aid bridge will be erected to cross new channel at the Niobrax River on the Harvest Trail, between O'Neill and Spencer.

**N. H., Portsmouth**—Plans have been approved for the erection of a bridge across the Piscataqua River here. H. W. Hobbs, engr. of War Dept. at Portland, Me.

**N. J., New Brunswick**—Bids will be re-advertised for the erection of a concrete bridge over Ireland's brook on road leading from Dunham's Corner to the Helmetta crossroads. Mr. Fox, county engineer.

**N. Y., Albany**—New York Central railroad will spend \$15,000 to enlarge and strengthen bridge carrying Columbia turnpike over main line tracks in Rensselaer. Bridge has a capacity of eight tons and the officials plan to strengthen span so it will be able to support 15 tons.

**Ohio, Youngstown**—Ordinance passed to issue \$450,000 worth of bonds to build bridge over railroad tracks at Belmont.

**Ohio, Chillicothe**—Co. engr. is now preparing plans for Crawford bridge, bids on which will be invited when plans are approved.

**Ohio, Cleveland**—Comrs. will submit \$200,000 bond issue to voters at next election to construct bridge over Big Creek Valley.

**Ohio, Dover**—W. A. Hartline, of county engineer's office, has advised council that cost of proposed Main St. crossing over Pennsylvania will be \$50,000. Council has taken no action.

**Ohio, Fremont**—Motor truck dropped through wooden bridge over creek on co. rd. several miles northeast of Fre-

mont. Heavy truck travel has weakened numerous bridges over creeks in Sandusky County.

**Ohio, Kenmore**—Comrs. are preparing an estimate of cost of proposed bridge at Kenmore Blvd. over Ohio Canal. Co. engr. now preparing plans for structure, cost of which will be not less than \$200,000.

**Ohio, Akron**—Voters of Summit County may be asked to approve a bond issue at the August primaries for constr. of a new bridge over the Ohio Canal at Kenmore Co., comrs. said. Steps have been taken toward hiring a consulting engr. to work with Co. Engr. Chas. J. Costigan in drawing up plans and specifications for the new bridge.

**Ohio, West Union**—Contract for repairing the Collier bridge has been awarded to Louis Bower of Myasville at \$5,650. There were no bids for the concrete beam bridge nor the concrete culvert on the Mason pike.

**Ohio, Youngstown**—Representatives of Pennsylvania Railroad and Erie and B. & O. with the Carnegie and Prior Hill steel companies meeting with the city officials have approved the scheme to construct a bridge on Division st. from Federal st. to bear Waverly ave. Plans with city engr. Lille to cost \$1,000,000.

**Ont., Whitby**—Ontario County Council plans to raise \$25,000 for the building of bridges and culverts. County Rd. Superintendent, D. J. Kean, Whitby.

**Ont., Dunnville**—Dept. Railways and Canals, Western Blk., Ottawa, soon receives bids building bridge here. About \$28,034.

**Pa., Scranton**—Council of Scranton have voted favorably on the proposed expenditure of \$197,500 for the construction of a bridge connecting Scranton and South Scranton.

**Tex., Orange**—Chamber of Commerce Executives have favored the erection of the interstate bridge spanning Sabine River at Orange. Approximate cost, \$450,000.

**Wash., Seattle**—Board of Pierce County comrs. have issued an official call for bids for constr. of a two-span 160-foot wood or concrete bridge to be built over Big Machell river at Eatonville. Plans and specifications are with county engineer at Tacoma.

**Wis., Madison**—The Wisconsin Highway Commission has surveyed the following bridge sites and is preparing plans for the bridges:

**Barron County**—Town of Dallas, the Soo Creek Bridge No. 2, a 10x16 ft. reinf. conc. span, conc. abuts. The Soo Creek bridge, a 12x16 ft. reinf. conc. span, conc. abuts.

**Dunn County**—Town of Otter Creek, the Bachelder bridge, an 8 ft. conc. box culvert.

**Langlade County**—Town of Polar, the Polar bridge, a 16x20 ft. reinf. conc. span, conc. abuts. Town of Ackley, the Marsh bridge, an 8x20 ft. reinf. conc. slab span, abuts.

**Pierce County**—Town of Rock Elm, the Blank bridge, to build one conc. abut.

**Price County**—Town of Ogema, the Carlstrom bridge, a 12x20 ft. reinf. conc. slab span, conc. abuts. Town of Harmony, the Beaver bridge, a 12x20 ft. reinf. conc. slab, conc. abuts.

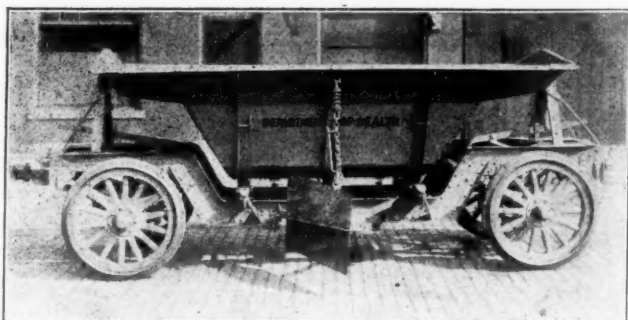
**Manitowoc County**—Town of Meeme, a 6x3x20 ft. reinf. conc. box culvert. Town of Meeme, the Elsters West bridge, a 6x3x20 ft. reinf. conc. box culvert. Town of Meeme, the West Kammas bridge, a 6x3x20 ft. reinf. box culvert.

**St. Croix County**—Town of Cylon, the Hanson bridge, two spans of 6x20 ft. reinf. conc. box culvert.

**Wood County**—Town of Cranmoor, the Reservoir bridge, two spans of 6x20 ft. reinf. conc. box culvert.

**Wood County**—Town of Cranmoor, the Reservoir bridge, two spans of 6x20 ft. reinf. conc. box culvert.

**Clark County**—Town of Beaver, the Rossman bridge, an 85x16 truss span, conc. abuts.

**LEE LINE**

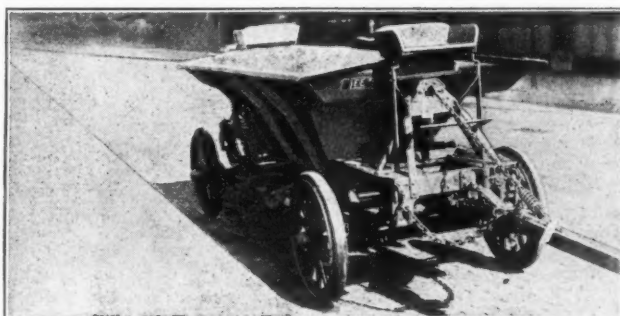
## Bridgeport, Conn.

DEPARTMENT OF HEALTH

USES

# Lee Drop Frame Trailers

Sixteen of them, with four heavy tractors, increase efficiency and speed of collection, at the same time bringing down costs and reducing the number of complaints by citizens to a minimum.



Commissioner of Public Works Courtrade or President W. E. Seeley of the Board of Apportionment will give information of Bridgeport's successful crusade towards perfection in sanitary conditions.

## For Garbage and Ash Collection

Lee drop frame trailers with watertight dump bodies are unequalled, as is proved in all cities which have adopted the Lee system.

*If it is a Trailer, Semi-Trailer, Motor Truck or Trailer Body or special handling or hauling equipment—we make it.*

**LEE LOADER & BODY CO.**

Builders of Automotive Auxiliary Equipment

2330 S. La Salle St.

Chicago



**LOW LOAD**

A Merriman Plant on the Job



The car measures 55 feet over all. The plant is easy to dismantle and set up. Has extra large hot-material bin and large mixer. Two melting kettles—a day's run in each. Each unit can be operated separately.

## Merriman Asphalt Plants

GET BETTER CONTRACTS FOR YOU

Good engineers are specifying steam melted asphalt because it is absolutely safe; gives better results and lasts longer. The steam melting system also saves money for the contractor because it makes it impossible to burn or coke the asphalt or burn the kettle bottoms. The complete plants are built in our factory by skilled mechanics—built to do real work and keep on the job always.

*Write for folders giving capacities and full information*

**EAST IRON & MACHINE COMPANY**

LIMA, OHIO

Chicago Office: Marquette Building



**Taylor County**—Town of Medford, the Grooney bridge, a 30x24 ft. reinf. conc. deck girder span, conc. abuts.

**Eau Claire County**—Town of Clear Creek, the Foster bridge, a 16x20 ft. reinf. span, conc. abuts.

**Pepla County**—Town of Lima, the Riley bridge, a 14x20 ft. reinf. conc. slab span, conc. abuts.

**Grant County**—Town of Lima, the Ditzman bridge, a 14x24 ft. reinf. conc. slab, conc. abuts.

**Waupaca County**—Town of Iola, the Omit bridge, a 20x20 ft. slab, conc. abuts.

**Sauk County**—Town of Honey Creek, the Pribe bridge, a 14x20 ft. conc. slab span, conc. abuts.

**Sheboygan County**—The Hingham bridge, a 14x14 ft. reinf. conc. slab span, conc. abuts. The Hingham bridge No. 2, 14x24 ft. reinf. conc. slab span, conc. abuts.

#### BIDS RECEIVED AND CONTRACTS AWARDED

(\*Indicate Contracts Awarded)

**\*Ariz., Phoenix**—C. B. Ragana awarded contract for constructing a concrete bridge over railroad draw in Greenlee Valley, at \$4,375.

**\*Cal., Los Molinos**—Contract for new concrete bridge across Los Molinos River awarded Zimmerman & Bordwell of San Francisco at \$31,500.

**\*Cal., Sacramento**—Contract for Squaw Hill Bridge between Vina and Corning on the Sacramento River awarded Zimmerman & Bordwell at \$236,200.

**Idaho, Boise**—Bids were opened in the dept. of public works on the bridge at Owsley's ferry.

Several bids submitted for the bridge at the ferry which is known as project No. 8, as follows: Security Bridge Co., \$97,800; Midland Bridge Co., \$107,700; U. S. Bridge Co., \$96,877; Union Bridge Co., \$97,941; Chas. H. Mull, \$103,187 taken under advisement.

**Illinois, Springfield**—Contracts awarded Bids received June 16, 1920. Project 1, Sec. 24, Whiteside Co., 4 conc. bridges, The Oltendorf Constr. Co., Palatine, Ill., \$33,580.00; Proj. 1, Sec. 25, Ogle Co., conc. bridge, The Oltendorf Constr. Co., Palatine, Ill., \$5,024.27; Proj. 11, Sec. S, Vermilion Co., conc. bridge, Love-Richards Co., Hoopston, Ill., \$23,515.00; Shelby Co., bridge, Jas. D. Anderson, Beecher City, Ill., \$835.00. Huffner-Anderson. Letting of June 1st.

**Ill., Springfield**—Bids received June 16, 1920, Federal Aid:

\*Project 1, Section 24, Whiteside Co., 4 conc. bridges, The Oltendorf Constr. Co., Palatine, Ill., \$33,580.

\*Project 1, Section 25, Ogle Co., conc. bridge, The Oltendorf Constr. Co., Palatine, Ill., \$5,024.17.

\*Project 11, Section S, Vermilion Co., conc. bridge, Love-Richards Co., Hoopston, Ill., \$23,515.

**Ill., Pontiac**—G. D. Butzer, supt. Livingston Co., let contract building McClinock bridge, McLean Twp., Riley bridge and Steidinger retaining wall, Forest Twp., to M. Paternoster, Fairbury, Ill. Total \$10,814; Miller bridge, Ford Twp., Trost, Haag and Rittenhouse bridges, Bailey and Shapland culverts, Sullivan Twp., to Continental Bridge Co., Peotone, Ill., \$9,000; Rugby and Schwendner bridges, Owego Twp., Stuckey bridge, Nebraska Twp., to H. J. Eppel, Graymont, Ill., \$8,172; Moon bridge, McFadden and viaduct culverts, Reading Twp., Edwards bridge, Charlotte Twp., Immke and Stoller bridges, Metz, Hoffman and Maurer culverts, Pleasant Ridge Twp., Colehouwer and Miller bridges, Long Point Twp., to Joliet Bridge & Constr. Co., Joliet, Ill., \$29,420.

**Ill., Springfield**—Hake-Mascoff Bridge, Hoyleton Twp., Washington Co., to A. C. Sligor, A. J. Sligor, Centralia, Ill., \$2,350.

**Ill., Springfield**—Weeks Bridge, Co-vington Twp., Washington Co., to A. C. Sligor, A. J. Sligor, Centralia, Ill., \$2,750.

**Ill., Springfield**—Fairbury Bridge, Indian Grove Twp., Livingston Co., to M.

Paternoster, Fairbury, Ill., for the sum of \$17,964. This letting was held on June 16, 1920.

**Ind., Indianapolis**—Board of co. comrs. received bids for construction of a concrete bridge over White River in the Northwestern ave. road, and it was expected that the contract would be awarded to A. J. Yawger & Co., on a bid of two submitted to the board, the National Concrete Company bidding \$298,000 and \$292,000 on two plans of construction.

**Iowa, Tipton**—Supervisors open ten bids submitted for over 100 jobs of bridge work. Work went to five different firm at total of \$143,641.80, and the contractors were given until Aug. 1, 1921, to complete work.

**Iowa, Nevada**—Bd. Supervs. Story Co. received bids, May 26, building steel plate girder bridge over Squaw Creek on Lincoln Way, to have three 72 ft. spans, 24 ft. roadway and one 5 ft. sidewalk from Cole Bros., Ames, \$45,258; Clinton Bridge Wks., Clinton, \$48,400; Koss Constr. Co., 2818 5th st., Des Moines, \$52,000.

**\*Mass., Miniota**—Contract for 3 bridges and 2 culverts awarded to E. Fulcher, Brandon, at \$8,722.

**\*Massachusetts**—Dept. Pub. Wks., Boston, let contract building state bridge, Oak Bluffs and Tisbury Twps., to F. C. Taylor, Fairhaven, \$26,629.

**\*Mass., Boston**—City let contract building 120 ft. bridge, 60 ft. wide, on Clarendon st., to J. McCourt Co., Waite st., \$117,308.

**\*Miss., Meridian**—Lauerdale Co. Supervisors awarded contract to J. B. Richardson, at \$18,972.80, to erect 3 bridges; contract to furnish steel for one of the bridges was awarded to Austin Bridge Co., Atlanta, Ga., and contract to supply steel for the other bridges was awarded to Highway Iron Products Co. of Indiana.

**\*Mont., Coburg**—The Buell Bridge Co. of Missoula awarded contract for a Savoy Creek bridge to be erected three mi. west of Coburg in Blaine Co. at \$10,697.

**\*Mont., Missoula**—The Buell Bridge Co. of Missoula awarded contracts for construction of a 175-foot riveted steel span set on concrete abutments, on the Chinook-Lohman road with a bid of \$20,650. The same company, with a bid of \$10,697, won contract for the Savoy creek bridge in Blaine county. Their bid of \$8,021 for project No. 81, located in Blaine County was also successful.

**Nev., Winnemucca**—Minneapolis Steel & Machinery Co., Minneapolis, Minn., was low bidder for steel for a bridge in Humboldt County, at \$6,834.

**N. J., New Brunswick**—Only bid received for concrete slab bridge over Ireland Brook on road between Funham's Corner and Helmetta Cross Roads submitted by Geo. Gundrum, South Amboy, at \$4,670.

**\*N. J., Atlantic City**—Contracts for constr. awarded at meeting of Chosen Freeholders. William Sharrock, lowest bidder for wooden structure to span Patcong creek, received contract for \$2,914. Clark & Johnson bid \$3,520. George Hanselman received contract for bridge over Landing creek and culvert at Egg Harbor. His bid for first was \$1,946 and for latter \$1,886. Clark & Johnson bid \$2,250.

**\*New Mex., Santa Fe**—Contract covering proposed const. of New Mexico Federal aid project No. 39, Quay Co., which includes Logan bridge over Canadian River. Awarded Midland Bridge Co., Kansas City, Mo. Length of bridge 734 ft., to include one 420 ft. steel arch span. L. A. Gillett, State Hwy. Engr.

**\*N. Y., Bronxville**—Contract for stone faced reinforced concrete arch bridge over Bronx River on Parkway Dr. south of Woodland Pl., White Plains, awarded by Bronx Parkway Comm., to Faillace Bros., 7 E. 42d St., N. Y. City, at about \$50,000.

**\*Ohio, Cincinnati**—Chas. Staab has been awarded contract for erection of culvert on Carmargo rd. at bid of \$16,715. Comrs. have authorized construction of conc. floor on two bridges on Eight Mile Rd. at estimated cost of \$4,000.

**\*Ohio, Cleveland**—Comrs. have awarded contract for construction of Indian Camp Run bridge to C. C. Mardin at bid of \$6,274.

**Ohio, Cincinnati**—Lowest bid received for bridge on Lawrenceburg-Harrison Rd. submitted by M. Hanlon, at \$1,400.

**\*Ohio, Youngstown**—Contract for retaining wall on E. Earl Ave. awarded to Lee Tiberio, at \$5,278.

Contract for sub-structure of bridge over Yellow Creek on Youngstown-Vicksburg Rd. awarded to S. R. Colucci, at \$4,185.

**\*Ohio, Youngstown**—Comms. awarded contract for the superstructure of the 20-ft. addition to the Yellow Creek in Struthers to Hunter Construction Co.; cost, \$10,946.

**Okla., Pond Creek**—Grant Co. soon receives bids building bridge across Salt Fork Arkansas River, north of here. About \$225,000. R. C. Terrell, Oklahoma, state engr.

**\*Ont., Grand Bend**—Contract for steel bridge awarded by Co. Council of Huron Co. to Canadian Bridge Co., Walkerville, at \$16,849.

**\*Ont., Ottawa**—Contract for bridge over Rideau River awarded by City Council to Thos. McMLaughlin, at \$288,964.

Contracts for 2 bridges awarded by Co. Council of Carleton Co. to Ontario Bridge Co., Toronto, and C. O. Wood, Ottawa.

**\*Pa., Harrisburg**—Ferro Concrete Co. awarded contract for the repair of wood truss bridge crossing Fishing Creek in Fishing Creek Valley, two mi. east of Fort Hunter, at \$2,166.

**\*Pa., Philadelphia**—Contract for steel bridge superstructure at Front St. and N. Frankfort Ave. awarded to Phoenix Bridge Co., at \$272,436; column foundations for superstructure, to Brown-King Construction Co., at \$38,299.

**\*Pa., Philadelphia**—City let contract to M. & J. B. McHugh, 892 North Markoe st., repairing bridge on Passyunk ave., over Schuylkill river, \$33,895; to Latta & Roberts, Drexel Bldg., Penrose Ferry Bridge, \$1,865; to W. Klinberg & Sons, Belmont and Girard Ave. Bridge over main line of Pennsylvania R.R., \$15,893. Noted May 27 under "Streets and Roads."

**\*Texas, Groesbeck**—Limestone Co. let contract building two steel bridges, all concrete bridges and all drainage structures in Groesbeck, Thornton and Ben Hur Dist. to Knox & Keeling, Mexia, About \$200,000; cost plus percentage basis. Work involves 2,500 cu. yd. reinf. conc., 100,000 cu. yd. earth approach and fill, 275,000 lb. structural and 216,000 lb. reinforcing steel.

**\*Washington**—State Highway Comm., Olympia, let contract building two reinf. conc. bridges on Olympic Highway, to N. Fleiness, Seattle, \$28,983.

**\*Wash., Millwood**—Spokane Co. let contract building 321 ft. bridge, 32 ft. wide, over Spokane River, here, involving 845 cu. yd. concrete and 70.89 ton reinforcing steel, to W. A. Beyers, 5518 Maple st., Spokane, \$64,980.

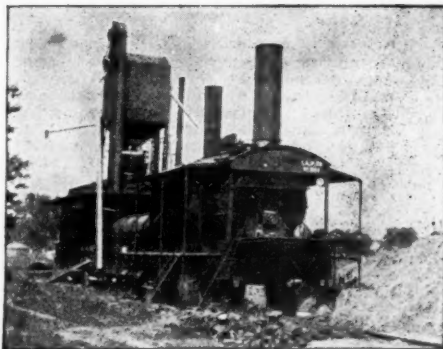
**\*Wash., Seattle**—United States Steel Products Co. of 4th Ave. South and Connecticut St., Seattle, awarded contract for the 919 ft. steel Hurricane Gulch Bridge, 170 miles north of Skagway, at \$329,323.

**\*Wis., Neenah**—City let contract building bridge, and retaining wall on Main St., to Blake Constr. Co., 627 South River St., Appleton, \$44,535.

**\*Wis., Ellsworth**—The Pierce County State Road and Bridge Committee let contract for grading and culvert work on the Eau Galle River Road to Isaacson Bros. & Mulheron, Spring Valley, Wisconsin. Grading 1,565 cu. yds. at \$0.60, \$939.00; culverts, 36.7 cu. yds. at \$26.00, \$954.20. Total, \$1,893.20.

**\*Wis., Grand Rapids**—The Wood County State Road and Bridge Committee let contract for building culverts on the Marshfield-Auburndale-Milladore road, Towns of Auburndale, Marshfield, Cranmoor to W. C. Teska, Auburndale, Wisconsin. 201.7 cu. yds. concrete at \$21.00, \$4,235.70.





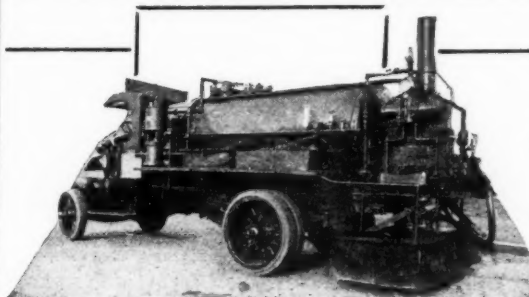
## MUNICIPAL STATIONARY PORTABLE & RAILROAD

# ASPHALT PLANTS

**THE BEST OUTFITS AND BEST PRICES**  
**WE BUILD THEM OURSELVES**

# HETHERINGTON & BERNER

INDIANAPOLIS, INDIANA, U. S. A.



**CRESSY  
MFG. CO.**

462 N. Second St.  
Everett, Mass.

## THE CRESSY SPRAYER GIVES LOWEST COST OF APPLICATION

There isn't another spraying machine on the market that can hold a candle to the low cost of application that a CRESSY PILLSBURY SPRAYER offers.

Why? Well, first because you waste no material by burning or uneven or indirect pressure—there are no pumps to clog and so no waste time—the pipes are always kept clean—and you get maximum results through minimum effort.

Road surfacing will be in full blast in a month. Why not get ALL the particulars of the CRESSY SPRAYER now?

## The 100% Advertising Medium for Bids for Public Works

This is the only weekly devoted exclusively to public work. Highways, streets, waterworks, water purification, sewerage, sewage disposal, bridges, irrigation, garbage disposal, fire protection.

It publishes nearly double as many contract news items regarding such work as any other paper.

And it is read first by contractors who specialize in public work. The circulation is national.

Rates for proposal ads—\$2.00 an inch.

**PUBLIC WORKS**  
243 West 39th Street, New York



## SAVE TIME AND LABOR

By purchasing the  
Dependable

## O. S. Locomotive Crane

for handling your material. We equip them with various automatic devices for the economical handling of material.

Write for details.

**Orton & Steinbrenner Co.**

Chicago, Ill.

Factory: Huntington, Ind.



## THE BUFFALO-SPRINGFIELD PRESSURE SCARIFIER

can be attached in the field to a macadam roller already in service. New Buffalo Pitts and Kelley Springfield rollers can be equipped with pressure scarifiers when so ordered. Unequalled for efficiency and economy.

Buffalo Springfield Roller Company, Springfield, Ohio  
MANUFACTURERS

### MISCELLANEOUS

**Conn., Norwich**—Plans are being prepared by Day & Zimmerman, engr. of Philadelphia, for the reconstruction of boilers, etc., for the U. S. Finishing Co., estimated cost, \$300,000.

**Cal., Grand Junction**—An issue of Co. bonds will be submitted to voters at the general election in November. Amount not stated. Chas. S. Jones, Co. Clk. and Recorder.

**Cal., San Francisco**—A mass meeting has been called for purpose of discussing an attempt to increase the interest rate on the State Hwy. Bonds. Bonds at present rate of interest 4 1-2 per cent are unsaleable and to market them state must endure a higher rate, probably 6 per cent added interest, would payers \$600,000 each year. Bond issue at today's prices will only complete about \$25,000,000 of good roads.

**Del., Wilmington**—Board of Harbor Comrs. contemplates improvement involving a wharf, 15,000 ft. long, on the

Christiana River, with two transit sheds. Project will call for an outlay of \$2,500,000.

**Ga., Savannah**—Board of purchase has been authorized to advertise and receive bids for two 5-ton motor tractors, one 2-ton motor truck, and 24 steel dump trailers for the scavenger department.

**Ind., Petersburg**—Work will begin as soon as bonds are sold and contract let for the construction of a ditch and the straightening of Pakoka River from Winslow, Pike County, to a point west near Wheeling. Estimated cost between \$45,000 and \$60,000.

**La., Baton Rouge**—Bill authorizing Dock Bd. of New Orleans to float \$6,500,000 bond issue for construction and maintenance of additional wharfage facilities reported upon favorably by House Comm. on City Affairs.

**Minn., Winnepeg**—Dredging of the Red River, to allow for the passage into Winnepeg and St. Boniface of lake barges will be commenced in July, according to officials of the joint harbor commission. The expenditure estimate to be \$25,000 will be borne by the Dominion Government.

**Mont., Great Falls**—More than 51 per cent of land owners under Sun River

bench irrigation project have signed up, announces Pres. H. W. Boynton of proposed project, and matter will now go to court on way to state irrigation comm. and issuance of more than \$4,000,000 of bonds for completion of project to irrigate 50,000 acres of land, limits of which join the limits of city of Great Falls. Twenty-seven thousand acres have already been signed up.

**Nev., Reno**—Washoe Co., Commrs., have decided to offer \$300,000 in 6 per cent bonds.

**N. Y., Schenectady**—Construction of the Great Western Gateway bridge over the Mohawk river at Schenectady received another setback when the only bid submitted was opened and revealed that the American Pipe and Constr. Co. of Philadelphia asked \$961,000 to do the work. Bid is \$300,000 in excess of the engineer's estimate. It is believed that it will be rejected.

**N. Y., Brooklyn**—Work on dredging East River off Clark St. is estimated will take about one year to complete and will make the East River and Hell Gate more navigable. One point where water is to be made deeper is that over which the tunnel runs from Wall St. to Clark St., Brooklyn, will be 45 feet deep when completed.

## TOO LATE FOR CLASSIFICATION

### STREETS AND ROADS

**Ia., Burlington.** 9 a.m., July 1  
To grade, curb with cement concrete and pave with one course of cement concr. 7 inches in thickness, 20 ft. in width, between curbs, Arch St., from the east line of Osborn St. to the west line of Central Ave.; and Central Ave., from the north line of that portion of Arch St. west of Central Ave. produced easterly to the north line of that portion of Arch St. east of Central Ave. produced westerly, 30 ft. wide between; also grading of various other streets.—Harry A. Vollmer, city engr.

**Minn., Brainerd.** 2 p.m., July 12  
Constr. and furnishing of materials for Job No. 1908, or any part thereof, on State Rd. No. 1.—C. W. Mahlum, co. aud., Crow Wing Co.

**Minn., Mora.** 3 p.m., July 14  
Constr. of Fed. Aid Proj. No. 91, state road No. 2, length 16.0 mi., which involves approx. 98,131 cu. yd. excav., 5,323 cu. yds. hand ditching, 6,650 lin. ft. guard rail; installing and furnishing of 900 lin. ft. 12-in., 1,040 lin. ft. 15-in., 43 lin. ft. 18-in., 231 lin. ft. 24-in., 126 lin. ft. 30-in., 283 lin. ft. 36-in. portable culvert pipe; loading and hauling 26,857 cu. yd. gravel surfacing material, placing 1,950 lin. ft. 8-in. tile; bridge No. 2154, three 55-ft. spans reinf. concr. 1 W66 34-in. reinf. concr. culvert.—A. V. Sander, co. aud., Kanabec Co.

**N. C., Asheville.** noon, July 7  
Constr. of approx. 5.00 mi. of state hwy. in Macon Co., involv. 42,430 cu. yds. common excavation, 15,570 cu. yds. earth borrow, 6,768 cu. yds. rock excav., 9,450 cu. yds. topsoil surfacing, 1,225 cu. yds. cement rubble retaining walls, structures under 20 ft. 00 in span., 261 cu. yds. Class "A" concr., 1,897 cu. yds. rubble cement masonry, 18,730 lbs. reinf. steel, 2 name plates.—W. S. Fallis, state hwy. engr.

**N. Dak., Washburn.** 10:30 a.m., July 9  
Constr. of a state hwy. between Turtle Lake and Underwood. Contemplated work consists of a 6-mile section (west from Turtle Lake) of a 10-mile project, which 6-mile section involves approx. 3 acres plowing and harrowing, 39,504 cu. yds. Class "B" excav., 2,876 cu. yds. Stas. overhaul, 2,340 lin. ft. wooden guard rail, 776 lin. ft. pipe culverts 18-in., 24-in. and 30 in. diam., 36.32 cu. yds. Class B (1:2½:5) concr., 378 lbs. reinf. steel, and certain other items.—State Hwy. Comm., Bismarck.

**N. D., Beach.** 10 a.m., July 7  
Constr. of a state hwy. east and west through Beach. Contemplated work con-

sists of two 5-mile sections of a 19.3 earth road improvement; also constr. of state hwy. between Petersburg and Michigan, which consists of about 5¼ miles of earth road improvement.—State Hwy. Comm., Bismarck.

### BRIDGES

**N. J., Elizabeth.** 1:30 p.m., June 30  
New steel and coner. bridge over brook at Marion and Livingston Sts., New Providence, Union Co.—Jacob L. Bauer, co. engr., 120 Broad St.

### MISCELLANEOUS

**N. J., Montclair.** 4 p.m., July 1  
Bids for furnishing one Chevrolet touring car for use in the Police Dept. of town of Montclair.—Harry Trippett, town clk.

**S. Dak., Webster.** 10 a.m., July 6  
Bids for furnishing all machinery, tools and materials necessary therefor and for constr. of the Blank Drainage Ditch, consisting of the excav. of approx. 54,000 cu. yds. open ditch, dry land dredge work.—S. H. Egeland, co. aud., Day Co.

### STREETS AND ROADS

**Ala., Birmingham**—City Council passed ordinance to provide for improvements on several streets. H. S. Ryall, co. clk.

**Can., Alberta**—Provincial Government, Edmonton, plans to build 15 mi. highway between Ft. Smith and Ft. Fitzgerald Dominion. Government will pay 40 per cent of cost.

**Idaho, Pocatello**—At meeting of Co. Comrs. H. E. Cornell was authorized to proceed with construction of hwy. in southeastern part of co. leading toward Malad. Cost of this work estimated about \$37,224.80.

**Ind., Indianapolis**—At Capitol Ave. and 16th St., Bd. of Pub. Works has adopted resolution to cut off southwest corner of intersection. Corner, which will be made part of street, runs 32 ft. on 16th St. and 40 ft. on Capitol Ave.

**Ind., Indianapolis**—Preliminary orders made designating asphalt as material to be used in resurfacing of Massachusetts Ave. and North St.

**Ind., Indianapolis**—Bids will be read-vertised for paving Blvd. Pl.

**Iowa, Burlington**—City engineer instructed to advertise for bids for paving Arch St. Material is to be cement, 7 in. in thickness and width of pavement will be 20 ft.

**Ky., Louisville**—Building activities in Louisville and other large cities will be

handicapped by the proposed increase in freight rates on sand and gravel, which would increase the cost of road building \$1,000 a mile and materially reduce contemplated construction of roads in Kentucky and other states.

**Md., Havre de Grace**—City Council has authorized the Street Comm. to macadamize eight blocks on Washington St., 16 ft. wide; five blocks on Washington St. Estimated cost, \$20,000.

**Mass., Lenox**—Comrs. of Berkshire Co. will establish and certify boundaries of section of hwy. in Lenoxdale, between Wood's Crossing, so called, and Elm St. As soon as lines are clearly and legally established selectment and Rd. Comm. William Walsh will begin building section of concr. rd. between these points so far as \$15,000 appropriated at town meeting will suffice.

**N. J., Newark**—Bd. of Freeholders of Sussex Co. will soon receive bids for constr. of about 2½ mi. of conc. pavement on the Ross corner, Sussex Rd.

**N. Y., Auburn**—City Council contemplates paving various streets. M. F. Dullea, city engr.

**N. Y., Brooklyn**—Seven hundred residents of Manhattan Beach have attached names to petition demanding that road be built connecting Manhattan Beach with Ocean Parkway, immediately. Boro Pres. Riegelmann.

**N. Y., Brightwaters, L. I.**—Property owners of village voted in favor of bonding the village for \$150,000 for permanent street improvements.

**N. Y., Plattsburg**—Paving of various streets contemplated; cost about \$75,000. Irving L. Wood, co. clk.

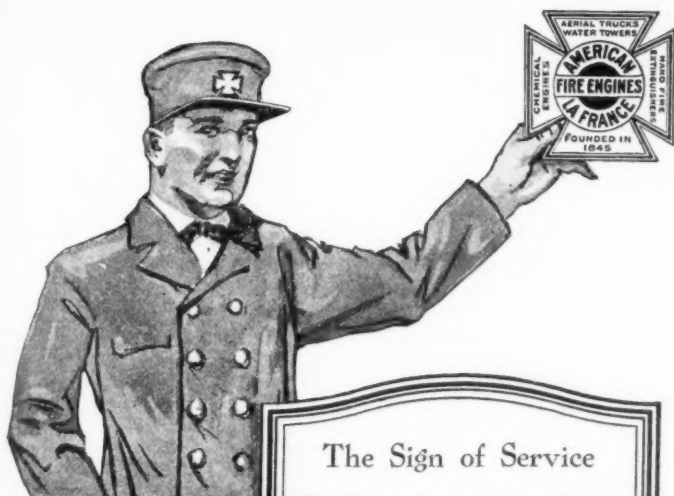
**N. Y., Watervliet**—Bd. of Pub. Works plans to pave 10,000 sq. yds. various sts. Address C. S. Keating, dir.

**Ont., Ottawa**—Montreal Rd., from the eastern boundary of Eastview, is to be designated as a provincial hwy., forming part of the Ottawa-Point Fortune route.

**Ont., Pembroke**—Renfrew Co. soon receives bids improving roads. About \$250,000.

**S. C., Charleston**—Bids will soon be asked for repair to Avenue D; cost, about \$8,500.

**Wash., Seattle**—Bd. of King Co. Comrs. ordered co. engr. to prepare plans for surfacing one mile of Ballinger rd. extension at Lake Forest Park, at estimated cost of approximately \$40,000. It is proposed to call bids on this undertaking as soon as plans and specifications are completed.



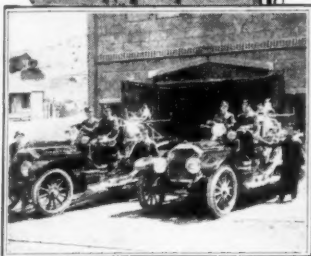
### The Sign of Service

Firemen the country over recognize in the American-LaFrance trade mark the symbol of the fire-fighting fraternity.

On American-LaFrance motor fire apparatus it stands for the essential qualities:

*Speed Power Reliability*

Qualities made possible by thorough American-LaFrance methods of workmanship, and time-tested design.



**AMERICAN-LA FRANCE FIRE ENGINE COMPANY, INC.**

### CONNERY'S NON-LEAKABLE—WELDED "HELD BY THE WELD"

Road and Roofing Tar, and Asphalt Heaters and Kettles  
All Sizes and Styles

**STRONG  
DURABLE  
PRACTICAL**



Other  
Sizes and Styles  
if Preferred.  
Write  
for complete  
Catalogue and  
Prices.

**STYLE "B"—THE ROAD LEADER**  
300—400—500 Gallons Capacity

Can be equipped with Warming Hood and Barrel Hoist

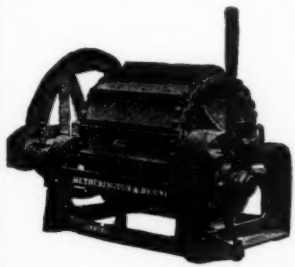
**CONNERY & CO., Inc.**

3900 N. Second St.

PHILADELPHIA, PA.

### The H & B Paving Brick Testing Machine

N. P. B. M. Standard Rattler



For the Testing of Paving Brick

As we now build this machine it embodies all of the

#### Latest Improvements

and refinements of construction that have been found desirable during a period of try-out covering almost one year of time and conducted under the direction of the technical committee of the National Paving Brick Manufacturers' Association.

For descriptive circular and prices address

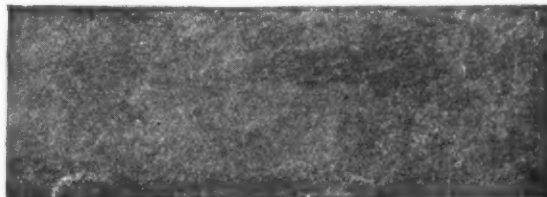
**HETHERINGTON & BERNER**  
INDIANAPOLIS, Ind.

# STANDARD

**COLD PATCH  
ASPHALT**

(Socony Brand)

For repairing all types of  
bituminous road surfaces



*Standard Cold Patch Asphalt*

**Repair the surface—  
you save the road**

Ruts and small holes promptly repaired with Standard Cold Patch Asphalt mean lower maintenance costs now and fewer expensive operations later on.

Its permanency, spreading qualities and ease of application save time, labor and material. Workable the year round.

### Other Standard Asphalt Products

**Standard Asphalt Binder A**  
for surface treatment.

**Standard Asphalt Binder B**  
for penetration work.

**Standard Asphalt Binder C**  
for the mixing method.

**Standard Refined Mexican Asphalt**  
for sheet and asphalt paving.

**Standard Asphalt Joint Fillers**  
for brick or block pavements.

**Standard Paving Flux**

**Standard Bridge Asphalt and  
Preserving Oils**

Specifications and all other particulars furnished  
on request

**STANDARD OIL CO. OF NEW YORK**

Principal Offices

New York  
Albany



Buffalo  
Boston



# OFFICIAL ADVERTISING

## Notice of Advertisement

Proposals will be received by the City Council of the City of Collinsville, Illinois, at the Council Chamber until 8:00 o'clock P. M., the 9th days of July, A. D. 1920, for the furnishing of all material and labor necessary in the alteration, extension and repairs of the municipal waterworks system, as proposed and outlined by plans and specifications for each class of work, which said plans are now on file in the office of the Clerk of said city, where they may be inspected and bidding blanks procured.

Each bidder will be required to accompany with his proposal a certified check in the amount of 10 per cent. of the amount of his bid for the guarantee that he will enter into a contract and bond in event of the award of the contract.

Each bid must be submitted on the form furnished by the city, which provides a means of bidding for each class of work separately or the work as a whole.

The City of Collinsville, Illinois, reserves the right to waive technicalities.

Contract to be awarded to lowest substantial bidder, subject to referendum vote of the electors of the City of Collinsville, Madison County, Illinois.

JAMES BAILEY, City Clerk.

**Treasury Department, Supervising Architect's Office, Washington, D. C., June 12, 1920.**—SEALED PROPOSALS will be opened in this office at 3 p. m., July 9, 1920, for a brick-set, down-draft, firebox heating boiler, automatic gas water heater, storage tank, etc., in the United States Post Office, Athens, Ohio, in accordance with drawings and specification, copies of which may be had at this office or at office of Custodian, Athens, Ohio, in the discretion of the Supervising Architect, Jas. A. Wetmore, Acting Supervising Architect.

## BIDS RECEIVED AND CONTRACTS AWARDED

(\* Indicates Contracts Awarded)

\***Ind., Bluffton**—Bd. of Wells County Comrs. let contr. for road work to C. T. Kain, Bluffton, Ind., at \$25,233.

\***Ind., Rushville**—Bd. of Rush County Comrs., W. H. McGillan, aud. let contr. for road in Oregon twp. to Chas. E. Redington, Greensburg, Ind., at \$54,618.

\***Ky., Bowling Green**—Contract for constructing conc. sidewalks awarded Ennis & Davis.

\***Ky., Frankfort**—State Hwy. Dept. let contr. for grading and paving to Covington & Co., Russellville, Ky., at \$46,000, and in Jessamine Co. to Higgins Constr. Co., Nicholasville, Ky.

\***Ky., Frankfort**—State Hwy. Dept. let contr. for rd. improvement in Fleming Co. to C. C. Owens & Co., Flemingsburg, Ky., at \$15,000.

\***Ky., London**—City Council let contr. for grading and paving to E. A. Chilton & Co.

\***Md., Baltimore**—City Council, A. B. Christhiff, engr., let contr. for paving alleys contrs. in various alleys to Aiello Constr. Co., Knickerbocker Bldg., Baltimore.

\***N. Y., Auburn**—City Council, M. F. Dullea, engr., let contr. for resurfacing in various sts. to Drayer Bros., Pierson Bldg., at \$49,512.

\***Neb., Fullerton**—Contract for paving awarded L. L. Beye, of Eldorado, Kan., at \$200,000.

\***Ont., Galt**—Standard Paving Co. of Ottawa awarded contract for paving

## NOTICE TO CONTRACTORS

State Commission of Highways,  
Albany, N. Y.

STATE COMMISSION OF HIGHWAYS—ALBANY, N. Y. Sealed proposals will be received by the undersigned at their office, No. 55 Lancaster Street, Albany, N. Y., at 1 o'clock p. m., on Friday, the 2nd day of July, 1920, for the reconstruction and resurfacing of the following:

ALBANY .....(One contract)  
COLUMBIA .....(One contract)  
DUTCHESS .....(One contract)  
FULTON .....(One contract)  
GREENE .....(One contract)  
LEWIS .....(One contract)  
ONEIDA .....(One contract)  
RENSSELAER .....(One contract)  
ULSTER .....(One contract)  
WARREN .....(One contract)

Maps, plans, specifications, estimates and proposals forms may be obtained at the office of the Commission in Albany, N. Y., and at the office of the division engineers in whose division the roads to be reconstructed are located. The addresses of the division engineers and the counties of which they are in charge will be furnished upon request.

The especial attention of bidders is called to "General Information for Bidders" on the itemized proposal, specifications and contract agreement.

FRED'K STUART GREENE,  
Commissioner.

IRVING V. A. HUIE,  
Secretary.

with asphaltic concrete at Beverly St., at \$4 per yd., with Trinidad asphalt.

\***N. D., Wahpeton**—Contract for road work awarded T. Mitchell, Mapleton, N. D.; W. H. Noel, Jamestown, N. D., and to Northwestern Sheet & Iron Works of Wahpeton.

\***Pa., DuBois**—Contract for paving awarded T. W. Muro, of DuBois. T. C. North, engr.

\***S. D., Kadoka**—Contract for road work awarded E. C. Pettijohn, of Kadoka.

\***Tex., Laredo**—Contract for constr. of Hwy. No. 12, from Laredo to Zapata Co. line, awarded W. T. Montgomery, of San Antonio, Tex.; and drainage structures awarded W. B. Kroeger and D. M. Basye, of San Antonio, at \$70,287.30.

\***Tex., San Antonio**—Contract for road work on Somerset Rd. awarded Uvalde Rock Asphalt Co., at \$23,000.

\***Tex., San Angelo**—Contracts for hwy. constr. on Hwy. No. 9 and A awarded to Hicks & Smith, of San Angelo, at \$262,018.16.

\***Utah, Ogden**—D. B. Brinton, of Murray, Utah, only bidder for the construction of the Heber-Fruitland Road, at \$58,000.

\***Utah, Ogden**—Utah Idaho Central R. R. Co. awarded contract for paving between the tracks of North Washington Ave., at \$170,000.

\***Utah, Provo**—At meeting of Co. Comr. contracts were let for paving 8.6 mi. of road in Utah Co. with conc. First piece of road let was co. rd. leading from Provo City to Lake View, 2.4 miles. Gray & Murdock, of Salt Lake, were successful contractors, their bid of \$64,371.70, or \$26,988.21 per mi., being accepted. Gray & Murdock were also awarded contract for 3 mi. leading from Pleasant Grove to Vineyard, their bid being \$86,194.14, or \$28,673.14 per mi. One and one-half mi. of conc. paving west through Lehi was

## BIDS JULY 12, 1920.

Warrenite Bithulithic, Concrete or  
Brick Pavement.

Sealed proposals will be received by John P. Jackel, City Manager, Auburn, N. Y., up until noon July 12, 1920, for the paving of Orchard Street from the west line of James Street to the east line of South Division Street, in the City of Auburn, N. Y., with approximately 12,000 square yards of either bithulithic, concrete or brick pavement and the laying of about 6,500 feet of cement curbing. Plans and specifications are on file in the office of City Engineer M. F. Dullea, Auburn, N. Y. A certified check payable to City of Auburn for 2½% of the price bid must accompany each proposal. The right is reserved to reject any and all proposals.

For further particulars inquire of the city manager or city engineer, Auburn, N. Y.

JOHN P. JACKEL,  
City Manager.

awarded Wattis & Samuels, of Salt Lake, their bid being \$39,959.80, or \$26,638.87 per mi. Wattis & Samuels were also awarded paving of 1.7 mi. west through Spanish Fork to sugar factory, at \$49,000, or \$29,000 per mi. Awarding of contract for 1.4 mi. through Payson was deferred to later date, Payson City having created paving district, which would widen present proposed road part of way for several feet.

\***Wash., Montesano**—J. C. Coyne, of Port Townsend, awarded contract for improving North River rd., at \$98,000.

\***Wash., Olympia**—Frank L. Anderson, of Malott, awarded contract for grading and graveling 3 miles of state rd No. 4, at \$22,388. J. O. Buedett, of Malott, for grading and graveling 4.14 mi. of the Chel-Okanogan rd. from Okanogan, at \$22,388.

\***Wash., Seattle**—Contract let to Fiorito Bros. calling for surfacing of one mile of two-mile Richmond Highlands-Richmond Beach rd. permanent highway No. 4A, on a bid of \$33,250.

\***Wash., Seattle**—Scalzo & Co., 1708 2nd Ave. So., awarded contract for construction of concrete walks on th Ave., N. E., at \$4,514; on West 54th St., at \$2,174; on — Ave., at \$5,587; on 54th St., at \$2,340. V. Ramaglia & Co., 4415 Corliss Ave., for grading sewers, etc., on West 54th and 8th Ave., N. W., for \$15,537.

\***Wash., Seattle**—Bids on Donohue Rd. No. 3, Creston to Peach, Lincoln Co. 1—Surfacing with crushed gravel. County to furnish complete crushing plant: N. W. Paving Co., Spokane, \$28,525.20; Auld & Thoms, Spokane, \$33,711.60; Root & Joslin, Spokane, \$37,169.20; Arthur A. Proulx, Almira, \$37,514.96; Triangle Const. Co., Ritzville, \$37,860.72; E. J. Cheatham & Sons, Spokane, \$38,898.00; Marsh & Brower, Spokane, \$48,406.40; R. L. Piken, Tonasket, \$49,270.80; S. G. Kinder, Mansfield, \$50,999.60; Martin Woldson, Spokane, \$56,186.00. Engineer's estimate, \$36,304.80. Awarded to Northwestern Paving Co. 2—Concrete pipes and culverts: C. F. Bond, Coulee City, \$9,751.32; N. W. Paving Co., Spokane, \$10,236.96; E. J. Cheatham & Sons, Spokane, \$10,373.45; C. A. McClung, Spokane, \$10,910.26; H. J. Mattes, Reardan, \$11,168.34; Auld & Thoms, Spokane, \$11,659.96; R. L. Piken, Tonasket, \$11,916.13;

Triangle Const. Co., Ritzville, \$11,969.10; Martin Woldson, Spokane, \$13,329.00. Engineer's estimate, \$11,329.86. Awarded to C. P. Bond. 3—Grading: R. L. Piken, Tonasket, \$47,928.83; S. G. Kinder, Mansfield, \$50,079.68; E. J. Cheatham & Sons, Spokane, \$50,727.60; N. W. Paving Co., Spokane, \$53,764.48; Arthur Proulx, Almira, \$56,092.32; H. J. Devlin, Harrington, \$56,397.40; Triangle Const. Co., Ritzville, \$58,999.24; Auld & Thoms, Spokane, \$62,745.54; Martin Woldson, Spokane, \$66,988.88; Geo. K. Marsh, \$69,257.00. Engineer's estimate, \$52,962.50. Awarded to S. G. Kinder.

## SEWERS

**Ill., Decatur**—Contractors have started digging two of the tunnels for big sewer No. 3, to cost \$280,000; there will be 7,000 ft. of 6-ft. segment block tile sewer; entire sewer will be 14,000 ft. long and will intercept all of present main sewers of city. It is designed to carry three times the dry weather flow for a city of 300,000.

**Ohio, Middletown**—City Comrs. planned selling \$50,000 of sewer bonds for extension Bulls Run sewer.

**Pa., Erie**—Street Director Eichorn will present a sewer ordinance to council for construction of a 9-inch sanitary sewer in 29th St., from a point 220 ft. west of the west line of State St. eastwardly to a point 225 ft. of east line of State, at a cost of \$2,700.

**Utah, Salt Lake City**—Bd. of Comrs. passed resolution of intention to make improvements by constructing and laying sewer lateral of first-class vitrified pipe 8 in. in diameter on west side of N St. Estimated cost, \$1,876.50. W. A. Leatham, co. rec.

## WATER SUPPLY

**Mich., Adrian**—As result of arguments offered by Adrian citizens that it would be impossible to sell proposed bond issue for purchase of Adrian water works, four Adrian banks have agreed to purchase at par as much of the \$200,000 as necessary to make purchase possible.

**N. J., Trenton**—Plans for installation of a new 25,000,000 gallon pump at the City Pumping Station at Calhoun St., and for the installation of a 1,000 h.p. generator, directly driven by a steam turbine, will be presented to City Comm. for approval. Comr. Fell.

## LIGHT AND POWER

**Ind., Anderson**—After hearing petition by city of Anderson for authority to issue bonds for \$350,000 for improvements on municipal light and power plant here, and for \$36,000 on water works, Paul Haynes, of Indiana Public Service Comm., expressed the belief that it is not advisable for city to proceed with such an enormous improvement in its entirety at once. He indicated suggestion would mean order restricting improvement plan to absolute need at this time. It was finally agreed that recommendation would be satisfactory and cost of taking care of immediate needs was then estimated at \$175,000. Haynes approved figure, and also approved \$36,000 bond issue for additions to water works.

## FIRE EQUIPMENT

**Ky., Louisville**—Installation of three new motor pumps and a motor combination hose and chemical truck equipped with a complete first aid outfit will be asked by Fire Chief Arnold Neunehwander in his annual report.

**N. J., Newark**—Recommendations were made to Twp. Comm. to take necessary steps to purchase a motor fire apparatus to cost from \$6,000 to \$12,000.

## BRIDGES

**Cal., Pasadena**—Plans approved for bridge over mouth of Millard Canyon. Address City Clk.

**Cal., San Luis Obispo**—Bids will be received shortly by Bd. of Supvrs. of San Luis Obispo Co. for reinforced concrete bridge over Salinas River, near San Miguel; estimate, \$100,000.

## EQUIPMENT BARGAINS

## FOR SALE

Offer wanted on complete steam equipment.

125 H.P. Holyoke boiler. 150 H.P.

150 H.P. Stewart Boiler.

1—Outside center packed Duplex Dean steam Pump 12 x 22 x 33 x 18. Complete with condenser.

2—Warren Feed Pumps 2½ x 2¾ x 4. Also one extra condenser.

This outfit has a capacity of two million (2,000,000) gallons per 24 hours and is complete and in first class operating condition. Can be seen at our plant on the Springfield Road, Thompsonville, Conn.

THE THOMPSONVILLE WATER COMPANY

## FOR SALE.

Clyde stump pulling machine for sale. In good condition. Price \$1400. Description on request.

REOLDS FARMS COMPANY,  
Oldsmar, Florida.

## FOR SALE.

Caterpillar bucket dredge for sale, \$1200. Larger than we require. Description on request.

REOLDS FARMS COMPANY,  
Oldsmar, Florida.

**Ga., Columbus**—It is planned to replace old steel bridge at 14th St. with new concrete structure; estimate, \$200,000. Address City Clk.

**Ill., Decatur**—New bridge being planned for Stare site, north of Farles Park, to replace one that was washed out by a freshet last spring.

**N. J., Hoboken**—Mandamus proceedings will probably be instituted by Hoboken Chamber of Commerce to force Bd. of Freeholders of Hudson Co. to award contracts for repair and rebuilding of 17th St. viaduct.

**Ohio, Cincinnati**—Sealed bids will be received till June 28 for purchase of coupon gold bonds to amount of \$1,000 for reconstruction of Ohio River bridge. Stanley Ferguson, secy.

## BIDS RECEIVED AND CONTRACTS AWARDED

(\* Indicates Contracts Awarded)

**\*Ala., Elba**—J. A. Peterson received contract to construct two reinforced concrete bridges, three 40-ft. girder spans, three 20-ft. slab spans. W. S. Keller, State Hwy. Engr., Montgomery, Ala.

**\*Ind., Indianapolis**—Contr. for bridge awarded Edward F. Smith, at \$20,998.

**\*Ind., Indianapolis**—Contract for const. of a conc. bridge over White River awarded A. J. Yawger & Co., at \$274,998.

**\*Mont., Helena**—Buell Bridge Co. awarded contract for constructing a 175-ft. riveted steel span set on concrete abutment on the Chinook-Lohman road, at \$20,650.

**\*N. J., Scott Plain**—Arthur E. Smith, of Park Ave., Plainfield, N. J., awarded contract for reinforced concrete arch bridge over Green Brook at Park Ave., Scotch Plains, N. J., at \$22,950.

**\*N. Y., Elmira**—Contract for bridge over Chemung River at Main St. awarded

## NOTICE TO CONTRACTORS

We have 35-mile road contract, East Carroll Parish, Louisiana; 150,000 cubic yards grading, 64,000 cubic yards gravel. Level country; no grubbing; average haul on gravel, ¾ mile. Will sub-let all or part at good price. We have machinery for unloading cars and loading wagons. Ideal job for party with large hauling equipment. Large supply of gravel already in stock.

Address:

NAT. A. KENT, Lake Providence, La.  
T. G. WOMACK, Kentwood, La.

## Contractors Equipment

Complete Stocks—Bargain Prices  
**ZELNICKER IN ST. LOUIS**

Get our 100-page Bulletin No. 289 for bargains in Ralls, Cars, Crushers, Piling Pipe, Tanks, Engines, Boilers, Generators, Excavators, Road Rollers, etc.

## Re-Newed Pipe

1-in. to 6-in.  
With New Threads and Couplings

**"We Test Our Pipe"**

Coates, Bennett & Reidenbach, Inc.

P. O. Box 1042, Rochester, N. Y.

to T. L. Eyre, 1537 Commercial Trust Bldg., Philadelphia, Pa., at \$402,575.

**\*Okla., Oklahoma City**—State Highway Dept. has let contract to the Boardman Co. of this city to build a bridge across the Cimarron River in Woods Co., at a cost of \$138,000. Structure is provided at Federal and state expense. It will be 1,280 ft. long. Forty spans will be built of concrete and must be completed within 400 working days.

**\*Tex., Dallas**—Contract for bridge work in Semar Co. awarded Austin Bros. Bridge Co., of Dallas, at \$143,000.

**Vt., Brattleboro**—Only bid received by Town Clb. May 15 for steel bridge over Connecticut River, between Brattleboro, Vt., and Hinsdale, N. H., submitted by United Construction Co., 24 James St., Albany, N. Y., at \$68,950.

**\*Wash., Olympia**—Contract for reinforced concrete bridge over Mud Bay awarded by State Hwy. Bd. to Union Bridge Co., Portland, Ore., at \$32,106.

**\*Wash., Olympia**—Nicholas Fielness, of Seattle, awarded contract for Mill Creek-Kamilchee Bridges on the Olympic Hwy., in Mason Co., at \$28,449. McRae Bros., of Seattle, for concrete bridge over Wildcat Cove in Skagit County for \$8,567.

**\*Wash., Spokane**—W. A. Byers, low bidder to construct conc. bridge across Spokane River at Millwood for \$64,980, was awarded contract by Co. Comrs.

## MISCELLANEOUS

**Cal., State**—State plans sign posts for Lincoln Hwy. work on Missouri River. Atlantic Coast stretch will soon be started, cost estimated at \$20,000.

**Tev., Dallas**—Tentative plans for a new garbage disposal system has been worked out by city engs. for city comm. Three incinerators to cost approximately \$150,000 included in plans.



# COLD PATCH

Maintenance Our Specialty  
**HEADLEY GOOD ROADS CO.**  
Franklin Trust Building  
Philadelphia, Pa.

# ASPHALT AND ROAD OIL

# AZTEC ASPHALT

THE  
**UNITED STATES ASPHALT  
REFINING COMPANY**

90 West Street, New York

## CUMMER PORTABLE ROAD ASPHALT PLANTS (3 Units)

750, 1250 and 1800 yards 2 in. sheet asphalt daily or other standard mixtures  
EASY CAPACITY OVER 100 IN OPERATION

WE AGAIN HAVE PLANTS IN STOCK FOR PROMPT SHIPMENT

**THE F. D. CUMMER & SON CO.**  
CLEVELAND, OHIO

No. 19 West 44th Street  
New York Offices:

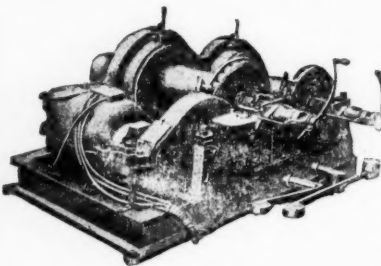
## JAEGER MIXERS—A MIX A MINUTE

FOURTEEN DIFFERENT OUTFITS

THREE DIFFERENT SIZES

The Jaeger line of mixers offers the user the most complete high-grade line ever offered under one name.

**THE JAEGER MACHINE CO., 400 DUBLIN AVE., COLUMBUS, OHIO**



### FLORY HOISTS

Prompt delivery of electric hoists with A. C. motors, 3 phase, 60 cycle 220-440 volts. We have on hand for prompt delivery a number of A. C. hoist motors 15 to 50 h.p. and can offer complete electrical hoists for prompt shipment, subject to prior sale. Send us your inquiries for immediate requirements.

**S. FLORY MFG. CO.**

BANGOR, PA.

New York, 95 Liberty Street; Pittsburgh, First Nat. Bank Bldg.;  
Chicago, Monadnock Block; Hartford, Conn.,  
K. B. Nahle Co.

### Hard Top Highways—Armor Plate Roads

**WILLITE**  
TRADE MARK REG. U. S. PAT. OFFICE

THE BEST SURFACE  
FOR LONG SERVICE

Willite Road Construction Co. of America  
51 Chambers St., New York City

WHEN YOU WRITE ADVERTISERS YOU WILL  
DO THEM AND US A FAVOR BY MENTIONING

**PUBLIC WORKS**

### PUMPING COSTS CUT

TO THE MINIMUM by using the

# ATLANTIC PUMPING ENGINES

Operation is Economical and Continuous

**Waldo Bros. and Bond Company**

Building Materials and  
Construction Equipment

Succeeding

Waldo Bros. Inc. and Harold L. Bond Company

Established 1869

Established 1900

181-A Congress Street

Boston 5, Mass.

WYCKOFF PIPE & CREOSOTING CO.  
30 East 42d St., NEW YORK  
Send for Catalogue "D"

## CREOSOTED WOOD BLOCKS

CONDUIT for underground wires, and WILL NOT BUCKLE OR DECAY  
all forms of creosoted wood:  
also Wooden Water Pipe and Steam Pipe  
Casings. Creosoting Works and Factory: Portsmouth, Va.

COTTON RUBBER LINED **FIRE HOSE**  
Wax and Para Gum Treated

MILDEW AND ROTPROOF

**Fabric Fire Hose Manufacturing Co.**  
Cor. Duane and Church Streets NEW YORK



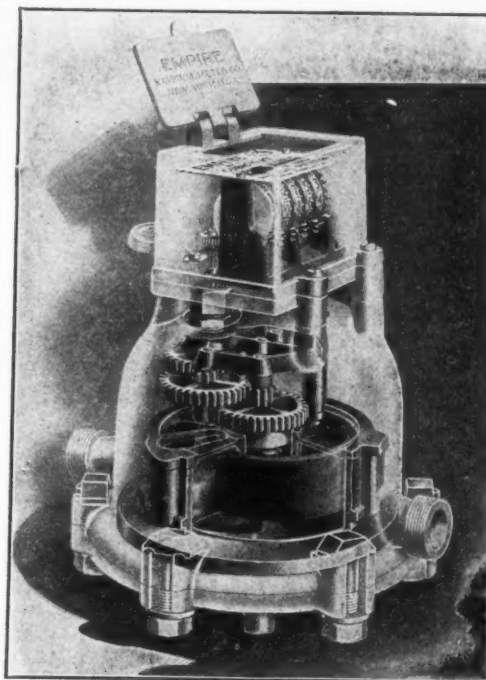
# WATER WORKS EQUIPMENT

## THE RIGHT METER FOR EVERY SERVICE

Our six different types fulfil every Department requirement and are all of the one unvarying standard of excellence.

**CROWN, NASH, EMPIRE, GEM  
EMPIRE-COMPOUND and PREMIER**

combine correctness of design, the best materials procurable, expert workmanship, together with fifty years' experience. The desire to satisfy you is the guiding idea in making them.



## The EMPIRE

Illustrated above, is the meter with the record of thirty years in service, with repair costs of less than  $\frac{1}{2}$  of 1% per annum. SEND FOR ILLUSTRATED CATALOGUE GIVING FULL PARTICULARS AND PRICES.

## NATIONAL METER COMPANY

Established 1870

299 BROADWAY, NEW YORK

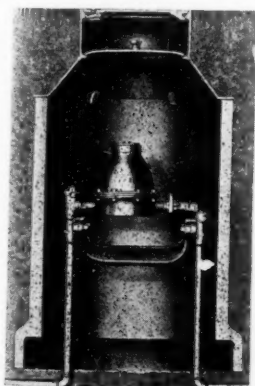
Branches in other principal U. S. cities; also Winnipeg and London

Buy "RENSSELAER" Valves  
— and —

"COREY" Fire Hydrants

Rensselaer Valve Company, Troy, N. Y.  
Branches: New York, Louisville, Pittsburgh, Chicago, New England

**UNION** WATER  
METER  
COMPANY  
INC. 1868  
Worcester Mass.  
Send for Catalog 499



## A Meter Well Bought Is Not Half Set

We believe that the curb is the only logical place for a water meter, for the following reasons:

- A.—Meter is safe from frost damage.
- B.—Meter is safe from tampering.
- C.—All water entering property is registered and leaks on inside piping will be promptly repaired.
- D.—Meter is less liable to damage from hot water backing up from range boiler when located at curb.
- E.—Ordinary curb box and curb stop may be done away with if desired.

There are a lot of other reasons, and meter boxes are cheap. Write us.

**FORD METER BOX CO.**

**Wabash, Indiana**

## APPROVAL HERSEY DETECTOR METER

*The Hersey Detector Meter has been accepted for thirteen years in 3', 4', 6', 8', 10' and 12' sizes without any restrictions or conditions of any kind by every Insurance Company, Stock and Mutual, doing business in the United States, and by the Water Departments and Water Companies in more than 600 Cities and Towns for use on over 4,000 Fire Services protecting over \$2,000,000,000 worth of Insured Property.*

HERSEY MANUFACTURING COMPANY  
BOSTON NEW YORK CHICAGO COLUMBUS, O  
PHILADELPHIA ATLANTA SAN FRANCISCO

### Buffalo Is Saving \$68,328 a Year

Following a PITOMETER SURVEY, water pumpage was reduced from 160,000,000 to 125,000,000 gallons a day. Washington is saving 45,000,000 gallons a day as a result of PITOMETER surveying. Two hundred other cities are also thousands of dollars better off because of water conservation by PITOMETER.

Your water problems are ours—write to us.

The PITOMETER CO., 27 Elm St., New York

How Much Can YOUR City Save?

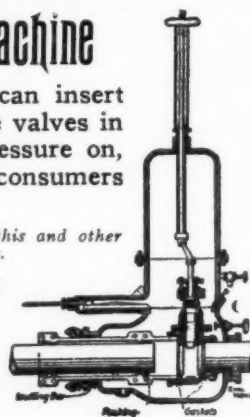
### Valve Inserting Machine

With this machine you can insert new and cut out defective valves in water mains with full pressure on, avoiding annoyance to consumers and increased fire risks.

Write for complete description of this and other water works specialties.

See Sweet's Catalogue, Engineering Edition, for Details and Particulars.

THE A. P. SMITH MFG. CO.  
EAST ORANGE, N. J.



### Municipal Accounting

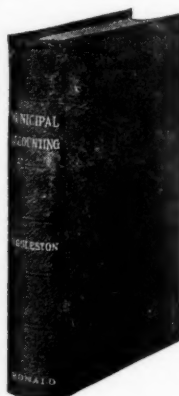
By De Witt C. Eggleston, C. P. A.

THIS is the most definite, thorough book on municipal accounting that has ever been published in this country.

It gives the method for handling every kind of financial transaction of a city, illustrated by a complete set of city accounts, worked out with specific figures.

Every journal entry, ledger account, balance sheet and form is right where you can put your hand on it and trace each transaction from its origin, through the books, into the financial statement. You have the whole procedure right in this volume.

456 Pages. Half Leather. Price \$4.

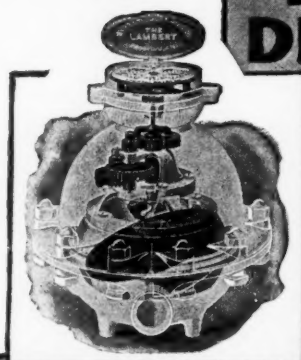


### Do You Want a Reliable Water Meter?

In the Lambert disc meter you will find—that every part of it from the flat hard rubber disc to the bronze pinions—is constructed of the best materials designed and built in the most workmanlike way. That makes them absolutely reliable.

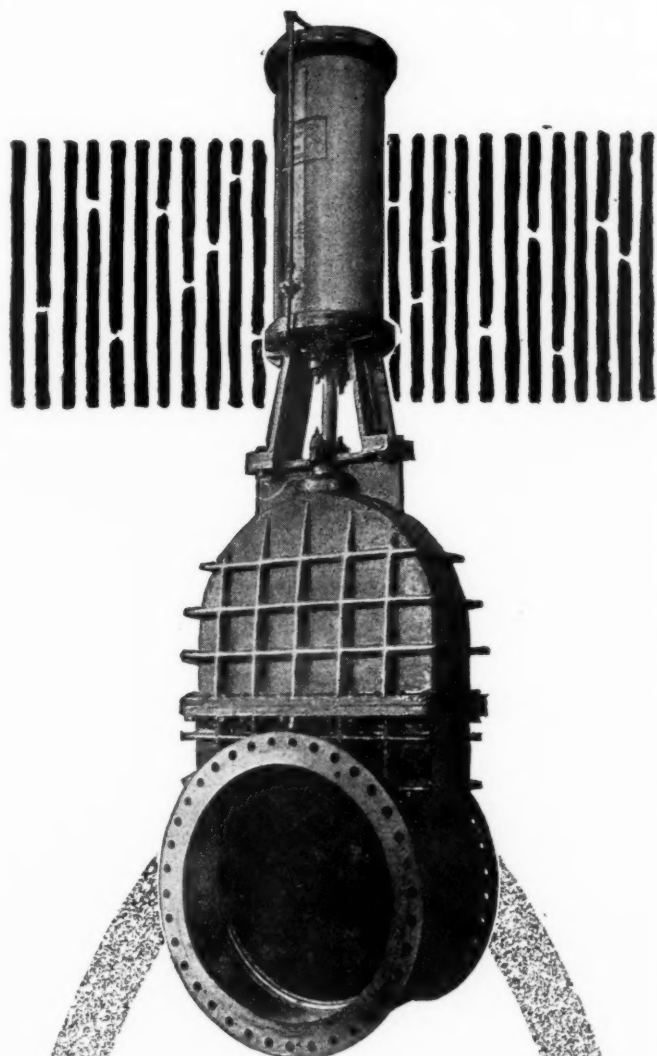
They cannot help but give you good long service. They do it for others—They will do it for you. Write for your copy of our bulletin today.

THOMSON METER CO.  
100-110 Bridge Street, Brooklyn, N. Y.



## LAMBERT DISC METERS

## ARE RELIABLE



ONE OF THE  
**KENNEDY  
BIG VALVES**

This "Newtype" Hydraulically Operated Water Gate Valve for waterworks and pumping stations is made in sizes up to 54 inches and has demonstrated its reliability in exacting service all over the continent.

It is also made with by-pass on side or end according to position of valve and we equip sizes of 24-inch and larger with rollers, tracks and scrapers to overcome the friction in operation of all large gate valves in this position.

The design of Kennedy products represents the very latest valve practice. The material used is always the soundest and most suitable. Our valves give extremely satisfactory service—maintain their tightness, are remarkably durable, and are low in maintenance expense.

*Send for our Catalog.*

**THE KENNEDY VALVE  
MFG. CO., ELMIRA, N.Y.**

NEW YORK: 95 John St.  
SAN FRANCISCO: 23-25 Minna St.  
CHICAGO: 204 N. Jefferson St.  
BOSTON: 47 India St.

Sales Offices:  
Philadelphia, Kansas City, Seattle,  
Salt Lake City, El Paso,  
Portland, Ore.,  
Winnipeg, Can.

141

?

# DO YOU KNOW

that for 2 cents a year per  
capita you can make your

**DRINKING WATER  
SAFE?**

**Liquid EBG Chlorine**

**The 100% Sterilizing Agent**

is destroying disease germs  
in hundreds of communities  
in the United States.

**LOOK FOR THE  
Red Cylinder**

**ELECTRO BLEACHING GAS CO.**

Pioneers and Leading Manufacturers of Liquid Chlorine

**Main Office: 18 East 41st St.**

**New York**

**Chicago Office: 11 South La Salle Street**

Southwestern Representative:

DAVID MOREY, JR., 507 Scollard Bldg., Dallas, Texas



# DIRECTORY OF CONSULTING ENGINEERS

Engaged in Municipal and Public Works

## ALVORD, JOHN W. BURDICK, CHAS. B.

Consulting Engineers

Reports, Investigations, Plans and Specifications for Water Supplies, Water Purification, Water Power, Sewerage, Sewage Disposal

Hartford Building, Chicago

## THE AMERICAN APPRAISAL CO.

Milwaukee New York

Authoritative Reports and Valuations Covering Public Utility, Municipal, Mineral, Industrial, Commercial and Residence Properties.

## EDWARD W. BEMIS CONSULTING ENGINEER

SPECIALIZING IN

Public Utility Appraisal; Audits, Rates, Service, Adjustments, Design, Construction and Supervision of Municipally-Owned Utilities.

*Assisted by an engineering  
and accounting organization*

101 Park Ave. 139 North Clark St.  
NEW YORK CHICAGO

## BLACK & VEATCH

Consulting Engineers

Inter-State Bldg., Kansas City, Mo.

Sewerage, Sewage Disposal, Water Supply, Water Purification, Electric Lighting, Power Plants, Valuations, Special Investigations, Reports.

N. B. Black N. T. Veatch, Jr.

## BROSSMAN, CHAS.

Consulting Engineer

Merchants' Bank Building, Indianapolis, Ind. Water Supply, Sewerage and Disposal. Lighting Plants—Supervision of Construction and Operation. Appraisals—Expert Testimony.

## BURNS & McDONNELL

Consulting Engineers

Appraisals Rate Investigations  
Expert Testimony Water Works  
Sewerage Lighting

Clinton S. Burns R. E. McDonnell  
Kansas City Inter-State Bldg.

## CAIRD, JAMES M.

Assoc. Am. Soc. C. E.  
Chemist and Bacteriologist

Office and Laboratory:  
271 River Street, Troy, N. Y.  
Water Analysis and Tests of Filter Plants

## COLLINS, JOHN L.

Consulting Civil & Sanitary Engineer

Water Supply and PURIFICATION  
SEWERAGE and SEWAGE DISPOSAL

Plans, Estimates and  
Supervision of Construction  
30 Church Street, New York City

## DOW & SMITH Chemical Engineers

Consulting Paving Engineers  
A. W. Dow, Ph.B. F. P. Smith, Ph.B.  
Mem. Am. Inst. Ch. Engrs.  
Mem. Am. Soc. Civ. Engrs.  
Asphalt, Bitumens, Paving, Hydraulic  
Cement, Engineering Materials.  
131-3 East 23d Street, New York

## When You Consult an Engineer

Look over the names of the men listed on this page. Each one of them is an expert and is ready to offer advice on any subject in their lines.

Wise cities recognize the fact that good advice costs less than mistakes, lawsuits or public disapproval.

The engineers whose cards appear here are prepared to place their years of demonstrated skill and efficiency at the disposal of cities who would build wisely.

HAZEN, WHIPPLE & FULLER  
Consulting Hydraulic and Sanitary Engineers, Water Supply, Sewerage, Drainage, Valuations, Supervisions of Construction and Operation.

ALLEN HAZEN G. C. WHIPPLE  
W. E. FULLER L. N. BABBITT  
C. M. EVERETT H. MALCOLM FIRNIE  
30 East 42d Street, New York City

## HILL AND FERGUSON

Consulting Engineers

Water Supply Sewage Disposal  
Hydraulic Developments  
Reports, Investigation, Valuations, Rates,  
Design Construction, Operation, Management Chemical and Biological  
Laboratories

112 E. 19th Street New York City

## HOWARD, J. W.

Consulting Engineer

Pavements and Roads

LABORATORY ANALYSES AND TESTS

Specifications Improved  
Expert in Valuation and Litigation

31 YEARS' EXPERIENCE

1 Broadway, New York City

## J. L. JACOBS & CO.

Industrial and Municipal Engineers  
Investigations—Reports—Plans

Covering  
Organization, Management, Accounting and  
Cost Methods, Employment and Wage  
Problems—Appraisals—Expert Testimony  
Monadnock Building, Chicago

## MORRIS KNOWLES, Inc.

ENGINEERS

MORRIS KNOWLES GEORGE F. MAGLOTT  
MAURICE B. SCHARFF JOHN M. RICE  
NATHAN B. JACOBS

Town planning and Municipal Engineering.  
Industrial Housing, Water Supply, Sewerage  
and Sewage Disposal, Flood Control, Hydro-  
Electro Developments, Investigations and Re-  
ports, Valuations and Appraisals, Rate Cases,  
Plans and Specifications, Supervision of Con-  
struction.

PITTSBURGH, PA., WINDSOR, ONT.

## POLLOCK & TABER

Consulting Engineers

Pavements, Highways, Water Supply,  
Drainage, Sewerage and Sewage Disposal.  
Designs, Specifications and Supervisions.

Clarence D. Pollock Am. Soc. C. E.  
George A. Taber Members

Park Row Bldg., New York City

## POTTER, ALEXANDER

50 Church Street, New York City

Civil and Sanitary Engineer

Specialties:  
Water Supply, Sewerage and Pavements

Specialist in all matters  
pertaining to

MUNICIPAL  
WATER SUPPLY SYSTEMS

JAMES P. WELLS

HYDRAULIC ENGINEER

Valuations, Reports, Surveys, Prepara-  
tion of Plans, and Supervision of Con-  
struction of Improvements.

Main Office:

Cutler Bldg., Rochester, N. Y.

Branch Offices in  
Central West, South and Canada.

New York City 2 Rector Street

## A. E. HANSEN

Hydraulic and Sanitary Engineer

Design and Supervision of Construction

Sewerage Water Works  
Sewage Disposal Water Purification  
Drainage Water Works Valuation  
Garbage Disposal Water Analysis

# BUYERS' CLASSIFIED DIRECTORY

of Names and Addresses of Firms from Whom to Buy Material, Appliances and Machinery Needed by Public Works Departments and Contractors

## CONTRACTORS' EQUIPMENT

(See Paving Machinery also)

**Aerial Tramways**  
Leschen & Sons Rope Co.

**Air Compressors**  
Fairbanks, Morse & Co.  
McKiernan-Terry Drill Co.  
Sullivan Mch. Co.

**Ash Handling Machinery**  
Blaw-Knox Co.

**Bar Benders**  
Koehring Mch. Co.

**Barges**  
American Bridge Co.

**Barrows**  
Waldo Bros. & Bond Co.  
Ransome Concrete Mch. Co.

**Blasting Powder**  
Atlas Powder Co.  
Du Pont de Nemours Co.  
Hercules Powder Co.

**Bridges**  
American Bridge Co.  
Blaw-Knox Co.

**Buckets, Automatic & Dumping**  
Blaw-Knox Co.  
Hayward Co.  
Ransome Conc. Mch. Co.  
Steubner Iron Works

**Buckets, Clam Shell, Drag-line, Orange Peel**  
Blaw-Knox Co.  
Brown Hoisting Mchry. Co.  
Hayward Co.

**Bunks**  
Southern-Rome Co.

**Cableways**  
Flory Mfg. Co.  
Lidgerwood Mfg. Co.

**Caissons**  
Underpinning & Foundation Co.

**Cars, Dumping and Industrial**  
Lee Loader & Body Co.  
Ransome Conc. Mch. Co.  
W. A. Zelnicker Supply Co.

**Carts, Concrete**  
Waldo Bros. & Bond Co.  
Ransome Conc. Mch. Co.

**Castings**  
American Bridge Co.  
Marion Malleable Iron Works  
U. S. Cast Iron Pipe & Foundry Co.

**Chutes, Coal**  
U. S. Cast Iron Pipe & Foundry Co.

**Cranes, Locomotive**  
Brown Hoisting Mchry. Co.

**Cranes and Hoists**  
Brown Hoisting Mchry. Co.  
Fairbanks, Morse & Co.  
Marion Steam Shovel Co.

**Crushers**  
Universal Road Mch. Co.  
W. A. Zelnicker Supply Co.

**Derricks**  
American Bridge Co.

**Drills**  
McKiernan-Terry Drill Co.  
Sullivan Mch. Co.

**Dump Wagons**  
Austin-Western Road Mch. Co.  
Tiffin Wagon Co.

**Engines**  
Waldo Bros. & Bond Co.  
Fairbanks, Morse & Co.  
Flory Mfg. Co.  
Lidgerwood Mfg. Co.  
Ransome Conc. Mch. Co.  
W. A. Zelnicker Supply Co.

**Excavators**  
Blaw-Knox Co.  
Hayward Co.  
Lidgerwood Mfg. Co.

## Mixers

Blaw-Knox Co.  
Waldo Bros. & Bond Co.  
Jaeger Mch. Co.  
Koehring Mch. Co.  
Ransome Conc. Mch. Co.

**Motor Trucks**  
Tiffin Wagon Co.

**Motor Truck Tires**  
Goodyear Tire & Rubber Co.  
U. S. Rubber Co.

**Pile Driving Machinery**  
Flory Mfg. Co.  
Lidgerwood Mfg. Co.  
McKiernan-Terry Drill Co.

**Paint Spraying Outfits**  
Fairbanks, Morse & Co.

**Pile Shoes**  
Janney-Steinmetz Co.

**Piles, Concrete**  
Underpinning & Foundation Co.

**Piles, Creosoting**  
Underpinning & Foundation Co.

**Piles, Interlocking**  
Ransome Conc. Mch. Co.

**Piling, Sheet Steel**  
Lackawanna Steel Co.  
Carnegie Steel Co.  
W. A. Zelnicker Supply Co.

**Plates, Steel**  
Lackawanna Steel Co.

**Pumps**  
Waldo Bros. & Bond Co.  
Emerson Pump & Valve Co.  
Fairbanks, Morse & Co.  
Standard Scale & Supply Co.

**Rails**  
Lackawanna Steel Co.  
W. A. Zelnicker Supply Co.

**Structural Steel**  
American Bridge Co.  
Pittsburgh-Des Moines Steel Co.

**Tanks**  
Pittsburgh-Des Moines Steel Co.

**Trench Braces**  
Storms Mfg. Co.

**Turn Buckles**  
American Bridge Co.

**Turn Tables**  
American Bridge Co.

**Wire Rope**  
Leschen & Sons Rope Co.

**Danger Signals**  
Ingram-Richardson Manufacturing Co.

## FIRE DEPARTMENT EQUIPMENT

**Combination Chemical and Hose Wagons**  
American-La France Fire Engine Co.

**Fire Alarm System**  
Loper Fire Alarm Co.

**Fire Hose**  
Fabric Fire Hose Co.

**Pumping Engines, Gasoline**  
American-La France Fire Engine Co.

**Rubber Tires**  
Goodyear Tire & Rubber Co.

**United States Rubber Co.**

**Triple Combination Motor**  
American-La France Fire Engine Co.

## PAVING AND ROAD MACHINERY

**Asphalt Plants**  
Cummer & Son Co.  
East Iron & Machine Co.  
Hetherington & Berner  
Warren Bros. Co.

**Car Unloaders**  
Universal Road Machinery Co.

**Concrete Mixers**  
Koehring Machine Co.  
Northwestern Steel & Iron Works  
W. A. Zelnicker Supply Co.

## Oil Distributors

Austin-Western Road Machinery Co.  
The Kinney Mfg. Co.

**Oil Sprayers**  
Universal Road Mch. Co.

**Road Drags**  
J. D. Adams & Co.

**Road Graders**  
J. D. Adams & Co.  
Austin-Western Road Machinery Co.  
Koehring Machine Co.  
F. B. Zieg Mfg. Co.

**Road Maintainers**  
J. D. Adams & Co.

**Road Planers**  
American Road Plane, Inc.  
Austin-Western Road Machinery Co.

**Road Rollers**  
Austin-Western Road Machinery Co.  
Buffalo-Springfield Rol'r Co.

**Rock Crushers**  
Austin-Western Road Machinery Co.

**Rock Drills**  
Sullivan Mch. Co.

**Motor Tandam Rollers**  
Austin-Western Road Machinery Co.

**Scarifiers**  
J. D. Adams & Co.  
Buffalo-Springfield Rol'r Co.  
Austin-Western Road Machinery Co.  
Universal Road Mch. Co.

**Scrapers**  
J. D. Adams & Co.  
Austin-Western Road Machinery Co.

**Screens**  
Universal Road Mch. Co.

**Spreaders**  
Burch Plow Works  
Good Roads Corp.  
Universal Road Mch. Co.

**Tar Kettles, Asphalt Heaters, etc.**  
Connery & Co.  
Littleford Bros.  
Warren Bros. Co.

**Steel Forms**  
Truscon Steel Co.

## PAVING MATERIALS

**Asphalt**  
Bitoslag Paving Co.  
Pioneer Asphalt Co.  
Standard Oil Co.  
Texas Co.  
U. S. Asphalt Refining Co.

**Binders**  
Barrett Co., The  
Standard Oil Co.  
Texas Co.  
U. S. Asphalt Refining Co.

**Bituminous Pavements**  
Barrett Co.  
Texas Co.  
Warren Bros. Co.  
Willite Road Construction Company, Inc.

**Expansion Joints**  
Barrett Co., The  
Truscon Steel Co.

**Oil**  
Barrett Co., The  
Headley Good Roads Co.  
Indian Refining Co.  
Republic Creosoting Co.  
Standard Oil Co.  
Texas Co.  
U. S. Asphalt Refining Co.

**Paving Brick**  
The Delaware Clay Products Co.

**The Wood Paving Blocks**  
Wyckoff Pipe and Creosoting Co.

**SCIENTIFIC INSTRUMENTS**  
Engineers' Transits and Levels  
Heller & Brightly

## SEWERAGE

**Culverts**  
The Delaware Clay Products Co.

**Culvert Forms**  
Storms Mfg. Co.

**Frames, Collapsible Culvert**  
Storms Mfg. Co.

**Pipe (Cast Iron)**  
Natl Cast Iron Pipe Co.  
Warren Foundry & Machinery Co.

**Pipe Cleaning Machines**  
Champion Corp.  
P. J. Healey  
W. H. Stewart

**Pipe Joint Compound**  
Pacific Flush Tank Co.

**Chemical Feeders and Mixers**  
W. J. Savage Co.

**Ejectors**  
Pacific Flush Tank Co.

**Nozzles**  
Pacific Flush Tank Co.

**Sewage Disposal Plants**  
C. P. Landreth  
Dorr Co., The  
Sanitation Corporation

**Sewage Disinfection**  
Electro Bleaching Gas Co.

**Rods**  
The F. Bissell Co.  
W. H. Stewart

**Screens**  
Dorr Co., The  
Green Bay Foundry & Machine Works  
Pacific Flush Tank Co.

**Siphons and Flush Tanks**  
Pacific Flush Tank Co.

**Vitrified Fire Clay Sewer Tiles**  
East Ohio Sewer Pipe Co., Irondale, O.  
The Delaware Clay Products Co.

**Vitrified Sewer Pipe**  
The Delaware Clay Products Co.

## STREET CLEANING AND REFUSE DISPOSAL

**Carts**  
Tiffin Wagon Co.

**Manholes—Catch Basins**  
Wm. E. Dee Co.

**Incinerators**  
Chicago Incinerator Co.  
Stacy-Bates Co.

**Sprinkling Wagons and Flushers**  
Austin-Western Road Machinery Co.

**Street Sweepers**  
Austin-Western Road Machinery Co.  
Elgin Sales Co.

**Universal Road Mch. Co.**

**STREET SIGNS**  
Ingram-Richardson Co.

**Vehicle Director**  
J. H. Lehman

## WATER WORKS

**Air Compressors**  
Sullivan Machy. Co.

**Air Lift Pumps**  
Sullivan Machy. Co.

**Centrifugal Pumps**  
Dayton-Dowd Co.  
Keystone Driller Co.

**Chloride of Lime**  
Mathieson Alkali Works  
Penn Salt Mfg. Co.

**Chlorine Liquid**  
Electro Bleaching Gas Co.  
Mathieson Alkali Works

**Deep Well Pumps**  
Cook, A. D.  
Keystone Driller Co.  
Layne & Bowler Co.

**Disinfecting Chemicals**  
Electro Bleaching Gas Co.

**Drinking Fountains**  
Murdock Mfg. & Supply Co.

## Filters

N. Y. Continental Jewell Filtration Co.  
Pittsburgh Filter & Engineering Co.  
Roberts Filter Co.

**Filtration Plants**  
Pittsburgh Filter & Engineering Co.  
Roberts Filter Co.  
Norwood Engineering Co.

**Filter Alum**  
Du Pont de Nemours Co.

**Fire Hydrants**  
Clark Co., H. W.  
Rensselaer Valve Co.

**Flap Valves**  
Coldwell-Wilcox Co.

**Meters**  
Clark Co., H. W.  
Hersey Mfg. Co.  
Natl. Meter Co.  
Pittsburgh Meter Co.  
Thomson Meter Co.  
Union Water Meter Co.

**Meter Boxes**  
H. W. Clark Co.  
McNutt Meter Box Co.  
Pittsburgh Meter Co.  
S. E. T. Valve & Hydrant Co.

**Meter Testing Machines**  
Pittsburgh Meter Co.

**Pipe, Cast Iron**  
National Cast Iron Pipe Co.  
U. S. Cast Iron Pipe & Fdry. Co.  
Warren Fdry. & Mach. Co.

**Pipe Laying Machines**  
McNutt Meter Box Co.

**Pipe, Steel**  
East Jersey Pipe Co.

**Pipe, Wood**  
Wyckoff Pipe & Creosoting Co.

**Pumps**  
Cook, A. D.  
Dayton Dowd Co.  
Keystone Driller Co.  
Sullivan Mch. Co.  
Layne & Bowler Co.

**Pumping Engines**  
Rife Engine Co.  
Sterling Engine Co.

**Screens for Wells**  
Cook, A. D.  
Layne & Bowler Co.

**Shear Valves**  
Coldwell-Wilcox Co.

**Sleeves and Valves**  
Kennedy Valve Mfg. Co.  
Smith, A. P., Mfg. Co.

**Sluice Gates**  
Coldwell-Wilcox Co.

**Strainers**  
Cook, A. D.

**Tanks**  
W. A. Zelnicker Supply Co.

**Tapping Machines**  
Smith, A. P. Mfg. Co.

**Valves**  
Clark Co., H. W.  
Kennedy Valve Mfg. Co.  
Rensselaer Valve Co.

**Valve Boxes**  
S. E. T. Valve & Hydrant Co.

**Waste Detection**  
The Pitometer Co.

**Water Main Cleaning**  
National Water Main Cleaning Co.

**Water Purification**  
Electro Bleaching Gas Co.  
N. Y. Continental Jewell Filtration Co.  
W. J. Savage Co.

**Water Regulators**  
Pacific Flush Tank Co.

**Water Sterilization**  
Electro Bleaching Gas Co.

**Water Supply from Well Systems**  
Cook, A. D.

**Well Drills**  
Layne & Bowler Co.

See Alphabetical Index on last white page.

## Before Placing That Order for Vitrified Pipe

SEWER PIPE  
CULVERT PIPE  
WALL COPING  
FLUE LINING  
STOVE PIPE  
BUILDING BLOCKS  
DRAIN TILE  
PAVING BRICK  
FIRE CLAY

Write for our prices and deliveries. We are the direct factory agents for the largest and best equipped plants in Pennsylvania and Ohio and it will pay you to

Let Us Figure On Your  
Requirements

HIGHEST GRADE  
FAIR PRICES  
QUICK  
DELIVERY  
DEPENDABLE  
SERVICE

### THE DELAWARE CLAY PRODUCTS COMPANY

611 TO 614-C ARROTT BUILDING

PITTSBURGH, PA.

Manufacturers of

### CAST IRON PIPE



FOR—WATER—GAS—CULVERTS—SEWERS

Also Flexible Joint Pipe—Cylinders—Tubes, Milled and Plain  
Ends—High Pressure Fire Service Pipe—Special Castings  
Flanged Castings a Specialty

Quality and Service Guaranteed



Warren Foundry & Machine Company

Offices, 11 Broadway, N. Y. 201 Devonshire St., Boston, Mass.  
Works, Phillipsburg, N. J.

## Mechanical Filtration Plants

for

Municipal and Industrial Purposes

also

THE "HOLYOKE"  
FIRE HYDRANT

Norwood Engineering Company

WORCESTER

MASS.

## NATIONAL CAST IRON PIPE CO., BIRMINGHAM, ALA. WATER PIPE—GAS PIPE

PROMPT SHIPMENTS

SALES OFFICES:

(Write Nearest Office for Prices)

NATIONAL CAST IRON PIPE CO., Peoples Gas Building, Chicago  
NATIONAL CAST IRON PIPE CO., Commerce Trust Bldg., Kansas  
City, Mo.

NATIONAL Pipe is made Right—on new equipment—by use  
of special cores.  
NATIONAL Pipe has smoothest inside finish—easiest to work.

### The NORTH SEWAGE SCREEN for Clarification

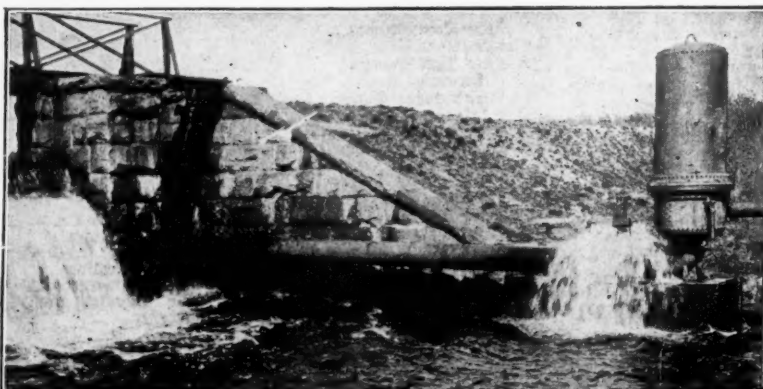
Adapted to Any System. Easy to install. Made to fit individual sewers.

No intercepting sewer needed.

Easy and cheap to Operate. No extra pumping. Only 2 h.p. No special labor or attention

Sanitary and Inoffensive. No odor. Solids taken out whole, screenings suitable for fertilizer.

The Green Bay Foundry and Machine Works, Green Bay, Wis.



A 12 in. Rife Hydraulic Ram installed for New York City Water Works.

## The Largest Ram in the World

that is used successfully is operating under a fall of four feet and a pumping head of twenty-one feet.

Write for catalogue

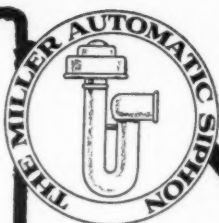
Rifle Engine Company

90 West Street

New York, N. Y.



**Let  
Machinery  
do the  
Dirty Work**



The adequate and proper disposal of sewage may be attended by modern automatic machinery without trouble and at a great saving in expense.

Miller Automatic Siphons will periodically flush the sewer lines, operating without care or attention. Sewage Ejectors, Imhoff Tanks, Septic Tanks, and other sewage collection and disposal machinery are available. We have six text-book catalogs, any or all of which we are glad to mail to you if you are interested.

**PACIFIC FLUSH-TANK CO.**  
SINGER BUILDING. NEW YORK  
4241-3 E. RAVENSWOOD AVE. CHICAGO

## **"Eagle Thistle" Brand of Products**

### **LIQUID CHLORINE**

One hundred per cent, pure anhydrous for use with any control apparatus.

Shipping in 105 lb., 150 lb., 2000 lb. Cylinders and Containers. Also shipped in Tank Cars when required.

Prompt shipments made, due to our large capacity.

### **CHLORIDE OF LIME**

Strongest, quickest settling, most stable Bleaching Powder manufactured.

Shipped in 225 lb., 450 lb., 750 lb. drums for domestic trade. Special wooden lined drums for export holding 400 lb.

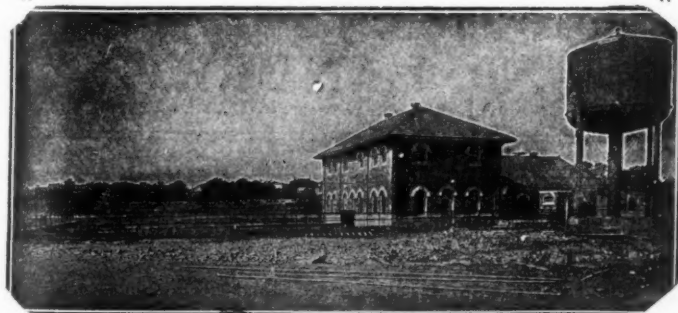
### **SODA ASH**

Our 58% Light Soda Ash is shipped in bags of 150 lb., 200 lb., and in 300 lb. barrels containing 250 lbs. Used in SOFTENING water by all who appreciate the economies of soft water in boilers, laundries, etc.

**The MATHIESON ALKALI WORKS**  
(INC.)

GENERAL OFFICES:  
25 WEST 43RD STREET, NEW YORK  
Works: NIAGARA FALLS, N. Y. WORKS: SALLVILLE, VA.

800,000,000 Gallons  
OF  
**PURE WATER**  
Daily Furnished by  
**PITTSBURGH FILTERS**



FILTRATION PLANT, WACO, TEX.

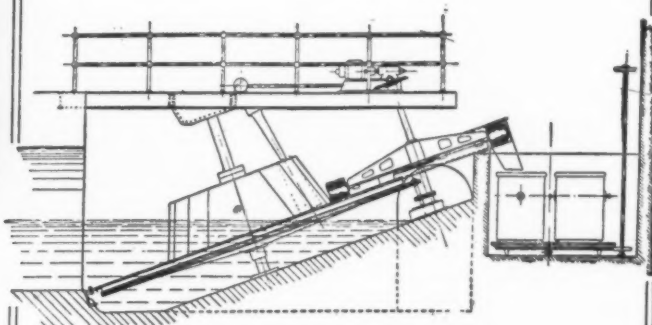
Over 200 Cities Supplied

We also manufacture  
**PITTSBURGH RECORDING METERS, Dry Feed  
Chemical Machines, Liquid Chlorine Ap-  
paratus, Controller Gauges, etc.**

**Pittsburgh Filter & Engineering Co.**  
PITTSBURGH, PA. KANSAS CITY, MO.

Works: Oil City Pa.

## **Modern Sewage Treatment SANITATION R-W PROCESS**



Outline, Riensch-Wurl Screen

**THE SANITATION CORPORATION**

Apparatus, Equipment and Complete  
Plants for Sewage Disposal

NEW YORK CITY

# INDEX TO ADVERTISEMENTS

A	Page	E	Page	K	Page	R	Page
Adams, J. D., Co.....	10	East Iron & Mach. Co., The	25	Kennedy Valve Mfg. Co....	35	Ransome Conc. Mach. Co..	—
Advance Engineering Co..	—	East Jersey Pipe Co.....	—	Keystone Driller Co.....	—	Rensselaer Valve Co.....	33
Alpha Portland Cement Co.	—	East Ohio Sewer Pipe Co..	37	Kinney Mfg. Co.....	6	Republic Creosoting Co....	—
Alvord & Burdick.....	36	Electro Bleaching Gas Co..	35	Knowles, Morris.....	36	Rife Engine Co.....	38
American Appraisal Co....	36	Elgin Sales Corp.....	—	Koehring Machine Co.....	—	Roberts Filter Mfg. Co....	40
American Bridge Co.....	8	Emerson Pump & Valve Co..	—			Russell Grader Mfg. Co....	—
American-La France Fire	—			L			
Eng. Co.....	29			Lackawanna Steel Co.....	—	S	
American Road Plane, Inc.	—			Landreth, C. P.....	40	Sanitation Corporation...	39
American Tel. & Tel. Co..	—	F		Layne & Bowler Co.....	—	Savage, W. J., Co.....	41
Atlantic Equipment Co....	—			Lee Loader & Body Co....	25	S.E.T. Valve & Hydrant	—
Atlas Powder Co.....	42	Fabric Fire Hose Mfg. Co..	32	Leschen & Sons Rope Co., A.	—	Smith, A. P., Mfg. Co.,	—
Austin-Western Road Mch.	—	Fairbanks, Morse & Co....	9	Lidgerwood Mfg. Co.....	6	Southern-Rome Co.....	—
Co.....	4 & 5	Flory Mfg. Co., S.....	32	Littleford Bros.....	—	Springfield Eng. Co.....	—
		Ford Meter Box Co.....	33	Loper Fire Alarm Co.....	—	Stacy-Bates Co.....	40
B						Standard Oil Co. (N. Y.)	29
Barrett Co., The.....	—	G		M		Sterling Eng. Co.....	—
Bemis, Edw. W.....	36			Mathieson Alkali Works...	39	Stewart, W. H.....	—
Bissell Company, F.....	—	Good Roads Corp., The....	—	Marion Malleable Iron Wks.	—	Storms Mfg. Co.....	—
Bitoslag Paving Co.....	—	Goodyear Tire and Rub. Co.	—	McKiernan-Terry Drill Co.	2	Stuebner, G. E.....	37
Black & Veatch.....	36	Green Bay Fdry. & Mch.	—	McNutt Meter Box Co....	41	Sullivan Machinery Co....	9
Blaw-Knox Co.....	—	Works.....	38	Mueller Mfg. Co., H.....	—		
Brossman, Chas.....	36			Murdock Mfg. & Supply Co.	—	T	
Brown Hoisting Mach'y Co.	7	H				Texas Co.....	12
Burch Plow Works.....	—			N		Thomson Meter Company...	34
Burns & McDonnell.....	36	Hansen, A. E.....	36	Nat'l Cast Iron Pipe Co...	38	Tiffin Wagon Company....	—
Buffalo Springf'd Roller Co.	27	Hayward Co.....	—	Nat'l Meter Co.....	33	Truscon Steel Co.....	—
C		Hazen, Whipple & Fuller..	36	Nat'l Paving Brick Mfrs.	—		
Calrd, James M.....	36	Headley Good Roads Co...	32	Assn.....	—	U	
Cast Iron Pipe Pub. Bureau	—	Healey, P. J.....	—	Nat'l Water Main Cleaning	—	Union Water Meter Co....	33
Champion Corporation.....	—	Heller & Brightly.....	37	Co.....	—	U. S. Asphalt Refining Co.	32
Chicago Incinerator Co....	40	Hetherington & Berner..	27-29	New York Continental	—	U. S. Cast Iron Pipe &	—
Clark, H. W., Co.....	—	Hercules Powder Co.....	—	Jewell Filtration Co., The	40	Fdry. Co.....	—
Clay Products Assn.....	21	Hering, Rudolph.....	36	N. W. Steel & Iron Wks...	—	U. S. Rubber Co.....	—
Coates, Bennett & Reiden-	—	Hersey Mfg. Co.....	34	Norwood Engineering Co..	38	Underpinning & F'dtion Co.	11
bach.....	31	Highway Trailer.....	36	Nye Odorless Cremat'y Co.	—	Universal Road Machy. Co.	4
Coldwell-Wilcox Co.....	40	Hill & Ferguson.....	36				
Collins, J. L.....	36	Howard, J. W.....	36	O			
Cook, A. D.....	—			Orton and Steinbrenner...	27	W	
Connery & Co.....	29	I				Waldo Bros. & Bond Co...	32
Cressy Road Sprayer Mfg.	—	Indian Refining Co.....	8	P		Warren Bros. Co.....	—
Co.....	27	Ingram Richardson Mfg.	9	Pacific Flush-Tank Co....	39	Warren Fdry. & Mach. Co	38
Cummer & Co., F. D.....	32	Co.....	—	Penn. Salt Co.....	—	Wells, J. P.....	36
D				Pioneer Asphalt Co.....	9	Willite Rd. Const. Co., Inc.	32
Dayton Dowd Co.....	—	J		Pitometer Co., The.....	34	Wyckoff Pipe & Creosoting	—
Dee, Wm. E., Co.....	—			Pittsburgh Filter & Eng.	—	Co.....	32
Delaware Clay Products	—	Jacobs Co., J. L.....	36	Co.....	39	Z	
Co., The.....	38	Jaeger Mch. Co.....	32	Pittsburgh Meter Co.....	34	Zeig, F. B., Mfg. Co.....	—
Dorr Co.....	—	Janney-Steinmetz Co.....	—	Pollock & Taber.....	36	Zelnicker, Walter A.....	31
Dow & Smith.....	36			Potter, Alexander.....	36		
Du Pont De Nemours Co.,	—						
E. I.....	—						

## FILTERS

Hypochlorite Apparatus and Water Softening Plants  
The New York Continental Jewell Filtration Company  
General Offices and Works: NUTLEY, N. J.  
111 West Monroe St., CHICAGO New Birks Bldg., MONTREAL

## Direct Oxidation Process

APPARATUS FOR CARRYING OUT THIS PROCESS  
FOR SEWAGE AND WATER TREATMENT SUP-  
PLIED UPON ENGINEERS' SPECIFICATIONS.

## C. P. LANDRETH

15TH and LEHIGH AVE. PHILADELPHIA, PA.

## City Waste Disposal Plants

REQUIRING NO COMMERCIAL FUEL

Designed and Built by

## CHICAGO INCINERATOR CO.

2131 South Turner Avenue, Chicago

## Roberts Filter Mfg. Co.

Darby, Penna.

WATER FILTER for Municipal and Industrial Plants.  
Gravity and Pressure Types.

CHEMICAL DEVICES

## DECARIE INCINERATORS

FOR MUNICIPALITIES AND INSTITUTIONS

—ECONOMICAL AND SANITARY—

## STACY-BATES COMPANY

MEKNIGHT BLDG. SELLING AGENTS MINNEAPOLIS  
WRITE FOR LITERATURE

## SLUICE GATES

Shear, Flap and Butterfly Valves

FLEXIBLE JOINTS

## COLDWELL-WILCOX CO.

Box 574

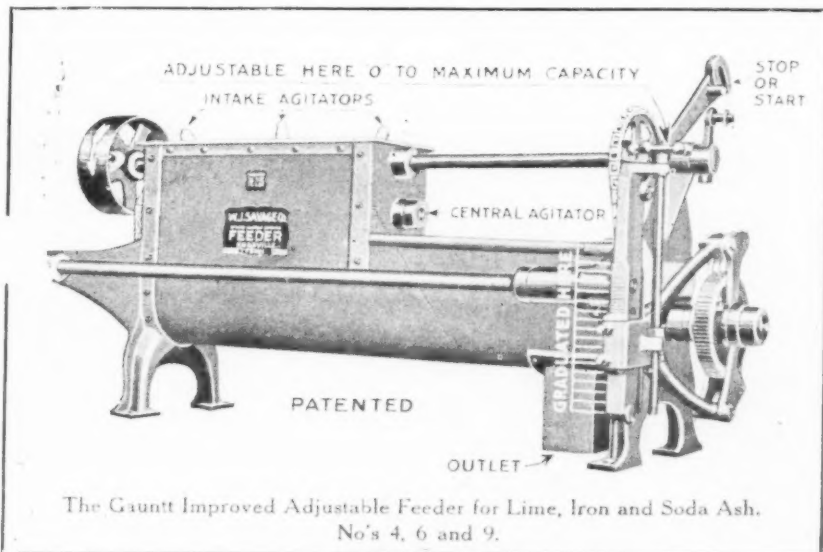
NEWBURGH, N. Y.

# Dry Chemical Feed Machines

For

## Lime, Soda Ash, Iron Sulphate and Alum

We Can Feed the Chemical in either Pulverized or Lump Form



**RELIABLE**  
**ACCURATE**  
and  
**EASILY ADJUSTED**

*List of users and full  
information upon request*

Manufactured by  
**W. J. SAVAGE CO.**  
Knoxville, Tenn.

## THIS MACHINE

### Lays Service Pipes Without Damage To Streets

Your city—every city—takes pride in the appearance of its streets. Millions of dollars are spent annually in their upkeep. Then why tear them up uselessly, in order to lay service pipes? Our new method enables you to install services under streets, tracks and even buildings, without any property damage.

## The McNutt High-Speed Pipe-Placing Machine

pulls services to place in full-length joints, either iron or lead pipe, in sizes from 4-inch diameter down to the smallest possible size. Two small excavations, one to hold the machine, the other across the street for the pipe entrance, is all you need. The McNUTT PIPE PLACING MACHINE is well made, powerful and easy to operate. Its sturdy simplicity fits it for hard, long-continued service. With this machine one man does the work of two in only a fraction of the time required under old methods. You save in cost of labor, in expense of street repairs, and protect your streets from damage.

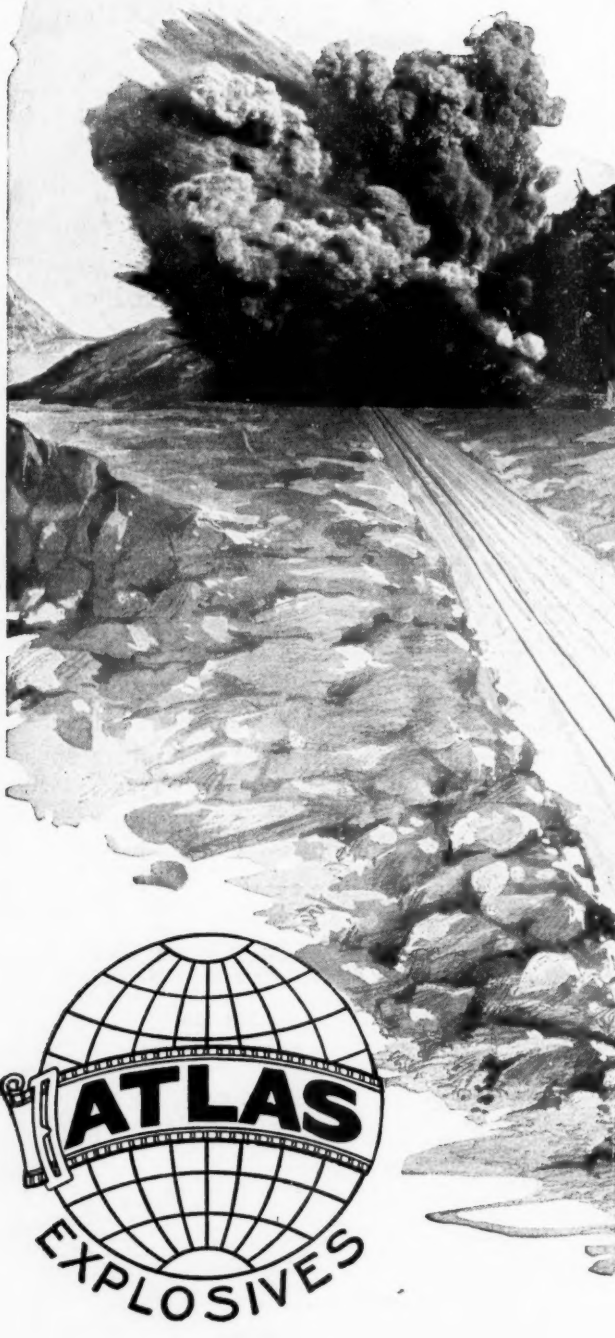
Write for literature describing this time-, labor- and money-saving machine. Complete information upon request.

**McNUTT METER BOX CO., Box 38 Brazil, Ind.**





# *Atlas Explosives*



are preferred by many road builders for

- Clearing right of way
- Removing stumps, boulders and ledges of rock
- Breaking up hardpan and shale for easy handling
- Making side hill cuts
- Blasting drainage ditches
- Securing material in quarry and gravel pits.

Those interested in any phase of road construction work are cordially invited to avail themselves of the assistance of our Service Division. Men with many years of experience in the use of explosives in road making will co-operate with you fully and freely.

Use of the right kind of explosives in the right way will reduce costs, and it is the business of ATLAS Service Men to see that costs are kept at the minimum. Put your blasting problems up to us.

## **ATLAS POWDER CO., Philadelphia**

Branch Offices: Allentown, Pa.; Birmingham, Ala.; Boston; Chicago;  
Des Moines, Ia.; Houghton, Mich.; Joplin, Mo.;  
Kansas City; Knoxville; McAlester, Okla.;  
Memphis; Nashville; New Orleans;  
New York; Philadelphia; Pittsburg, Kans.;  
Pittsburg, Pa.; Pottsville. Pa.; St. Louis;  
Wilkes-Barre.

# *make grading easy*

